



# PERFORMANCE AND ACCOUNTABILITY REPORT



FISCAL YEAR 2006

**DRAFT**  
**10/19/06**

# FOREWORD

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The Reports Consolidation Act of 2000 authorizes Federal agencies to consolidate various reports in order to provide performance, financial and related information in a more meaningful and useful format. In accordance with the Act, the Department of Energy (Department or DOE) has produced its fiscal year (FY) 2006 Performance and Accountability Report (PAR) in the following reporting formats that will serve multiple audiences and users with varied levels of detail:

- The PAR, as a full report that provides a thorough documentation of the stewardship of our mission-critical resources and services provided to the American people.
- The PAR Highlights, an executive summary version of the full report.
- The PAR CD, featuring a PDF version of the full report.
- The PAR internet website at [www.cfo.doe.gov/progliaison/par2006.htm](http://www.cfo.doe.gov/progliaison/par2006.htm), featuring all PAR reporting formats.

All PAR reports are organized by the following four sections:

**Management's Discussion and Analysis** section provides executive-level information on the Department's history, mission, organization and performance highlights within our critical mission objectives, analysis of financial statements, systems, controls and legal compliance and other challenges facing the Department.

**Performance Results** section provides detailed information and an assessment of our progress on all of the Department's performance goals and targets for the past four years.

**Financial Results** section provides a Message from the Chief Financial Officer, the Department's consolidated and combined financial statements, and the Auditors' Report.

**Other Accompanying Information** section provides the Inspector General's and Performance Management Challenges, Improper Payments Information Act Reporting Details and other statutory reporting.

## This report meets the following legislated reporting requirements:

- **Department of Energy Organization Act of 1977** – requires an annual report on agency activities.
- **Federal Managers' Financial Integrity Act (FMFIA) of 1982** – requires a report on the status of management controls and the most serious problems.
- **Federal Financial Management Improvement Act (FFMIA) of 1996** – requires an assessment of the agency's financial systems for adherence to government-wide requirements.
- **Inspector General (IG) Act of 1978 (Amended)** – requires information on management actions in response to Inspector General audits.
- **Government Performance and Results Act (GPRA) of 1993** – requires performance results achieved against all agency goals established.
- **Government Management Reform Act (GMRA) of 1994** – requires agency audited financial statements.
- **Reports Consolidation Act of 2000** – requires the consolidated reporting of performance, financial and related information in a Performance and Accountability Report.
- **Improper Payment Information Act (IPIA) of 2002** – requires reporting on agency effort to identify and reduce erroneous payment.
- **Federal Information Security Management Act (FISMA) of 2002** – requires annual evaluations of information security programs and practices.

PAR internet website at  
[www.cfo.doe.gov/cf1-2/par2006.htm](http://www.cfo.doe.gov/cf1-2/par2006.htm)

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# TABLE OF CONTENTS

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## Message From the Secretary

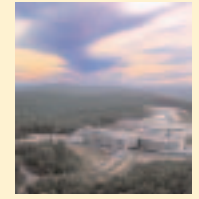
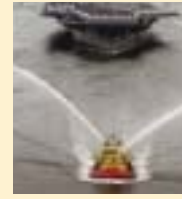
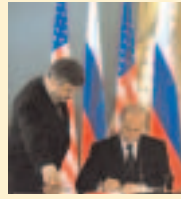
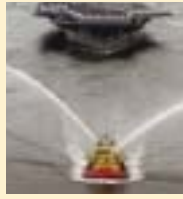
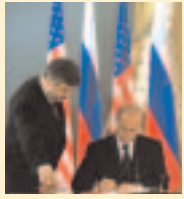
<b>MANAGEMENT'S DISCUSSION and ANALYSIS</b>	<b>1</b>
History, Mission and Organization Highlights	3
Performance Goals, Objectives and Results	9
Defense - Meeting National Security Challenges	13
Energy - Investing in America's Energy Future	19
Science - Advancing Scientific Understanding	29
Environment - Eliminating the Environmental Legacy	37
Corporate Management	43
President's Management Agenda	43
Analysis of Financial Statements	45
Analysis of Systems, Controls and Legal Compliance	47
Management Assurances	47
Management Challenges and Significant Issues	49
Improper Payments Information Act	56
<b>PERFORMANCE RESULTS</b>	<b>57</b>
Performance Introduction	59
Detailed Performance for General Goals 1-7	61
Status of Unmet FY 2005 Performance Targets	141
<b>FINANCIAL RESULTS</b>	<b>147</b>
Message From the Chief Financial Officer	149
Consolidated and Combined Financial Statements	151
Principal Statements	152
Notes to the Consolidated and Combined Financial Statements	158
Consolidating Schedules	188
Required Supplementary Stewardship Information (RSSI)	200
Required Supplementary Information (RSI)	208
Auditors' Report	211
<b>OTHER ACCOMPANYING INFORMATION</b>	<b>215</b>
Inspector General's Management and Performance Challenges	217
Improper Payments Information Act Reporting Details	220
Other Statutory Reporting - Management's Response to Audit Reports	221
<b>GLOSSARY OF ACRONYMS</b>	<b>223</b>

# MESSAGE FROM THE SECRETARY

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# MANAGEMENT'S DISCUSSION AND ANALYSIS

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# HISTORY, MISSION AND ORGANIZATION HIGHLIGHTS

## — HISTORY —

The Department has one of the richest and most diverse histories in the Federal Government, with its lineage tracing back to the Manhattan Project and the race to develop the atomic bomb during World War II. Following that war, Congress created the Atomic Energy Commission in 1946 to oversee the sprawling nuclear scientific and industrial complex supporting the Manhattan Project and to maintain civilian government control over atomic research and development. During the early Cold War Years, the Commission focused on designing and producing nuclear weapons and developing nuclear reactors for naval propulsion. The creation of the Atomic Energy Commission ended the exclusive government use of the atom and began the growth of the commercial nuclear power industry, with the Commission having authority to regulate the new industry.

In response to changing needs and an extended energy crisis the Congress passed the Department of Energy Organization Act in 1977, creating the Department of Energy. That legislation brought together for the first time not only most of the government's energy programs, but also science and technology programs and defense responsibilities that included the design, construction and testing of nuclear weapons. The Department provided the framework for a comprehensive and balanced national energy plan by coordinating and administering the energy functions of the Federal government. The Department undertook responsibility for long-term, high-risk research and development of energy technology, federal power marketing, energy conservation, the nuclear weapons program, energy regulatory programs, and a central energy data collection and analysis program.

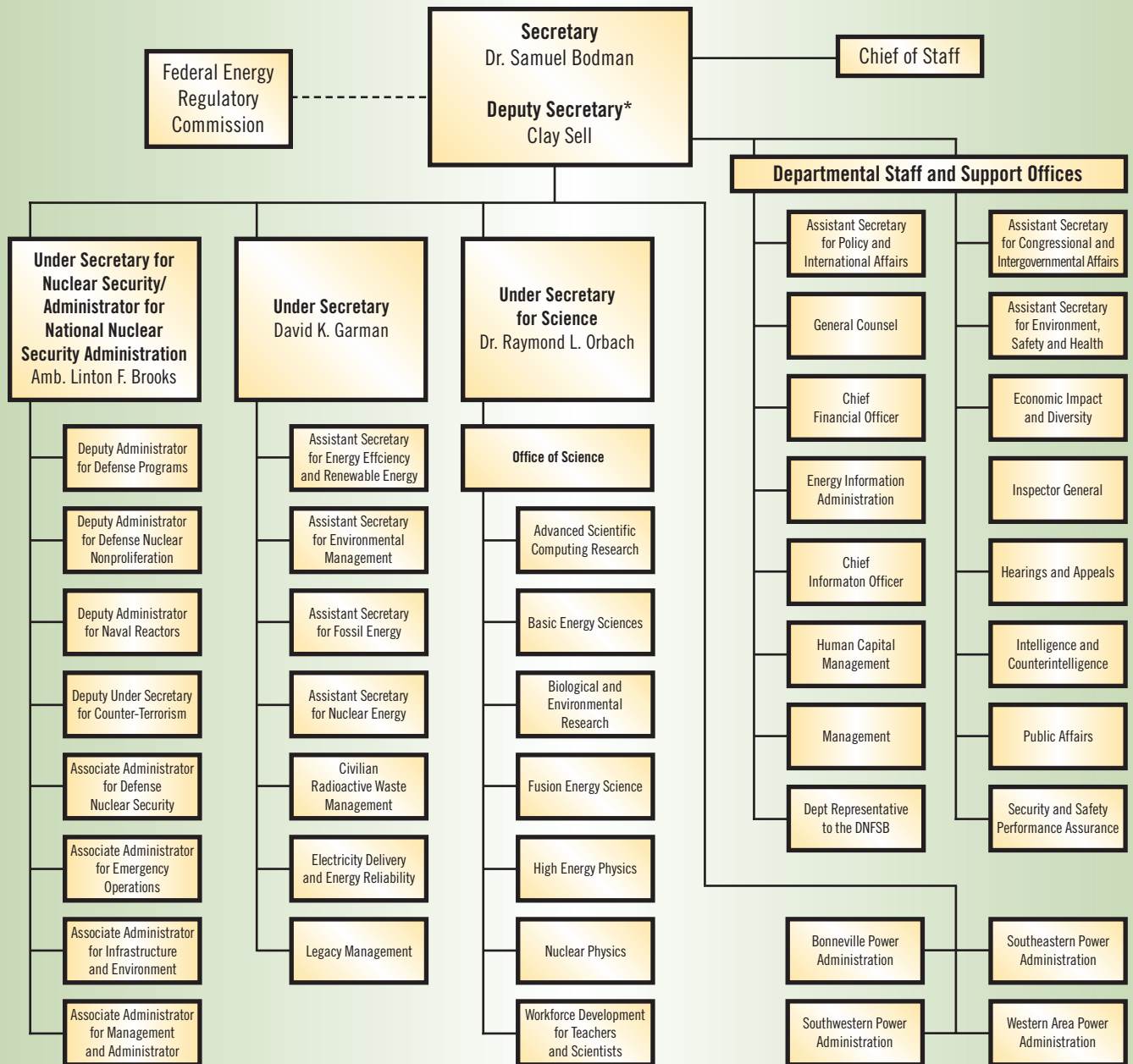
Over its history, the Department has shifted its emphasis and focus as the energy and security needs of the Nation have changed. Today the Department contributes to the future of the Nation by ensuring our energy security, maintaining the safety and reliability of our nuclear stockpile, cleaning up the environment from the legacy of the Cold War and developing innovation in science and technology.



— MISSION —

To advance the national economic and energy security of the United States;  
To promote scientific and technological innovation in support of that mission;  
To ensure the environmental cleanup of the national nuclear weapons complex.

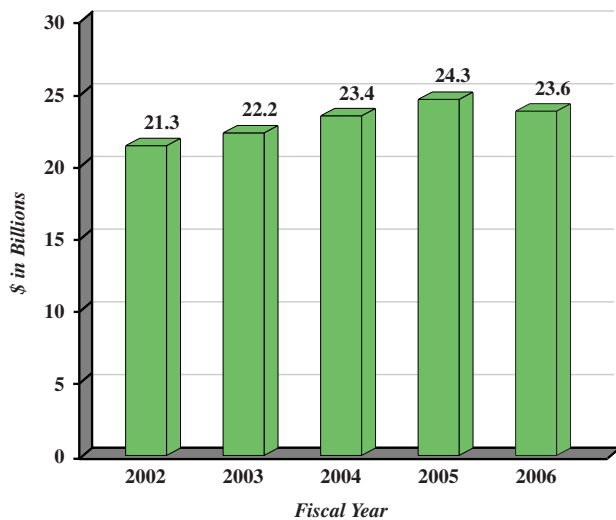
— ORGANIZATION STRUCTURE —



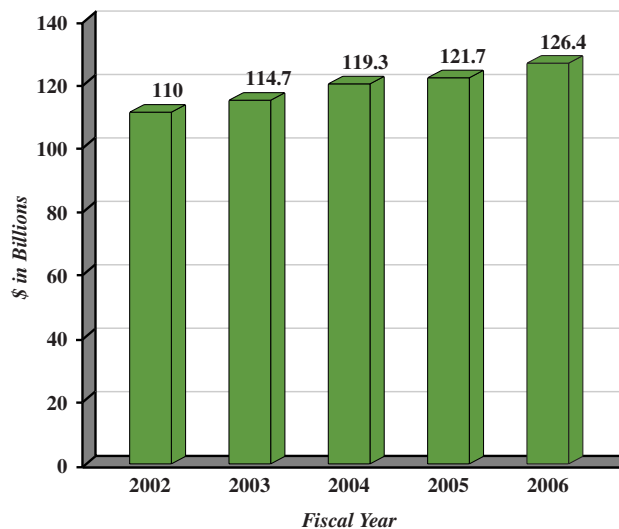
\* The Deputy Secretary also serves as the Chief Operating Officer

## — FINANCIAL RESOURCES —

## Funding

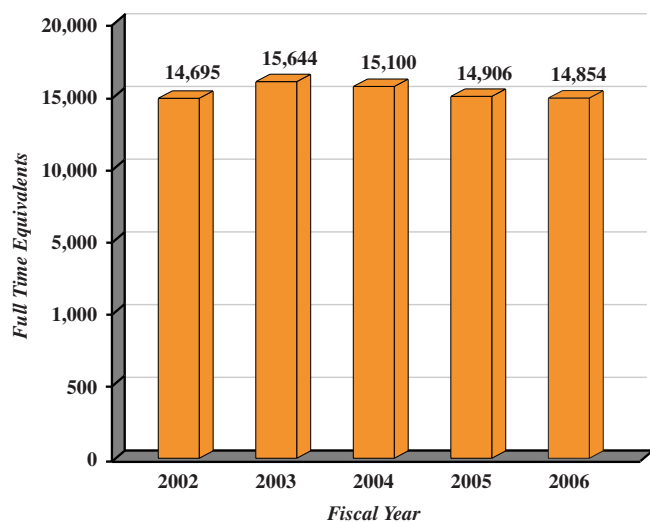


## Assets

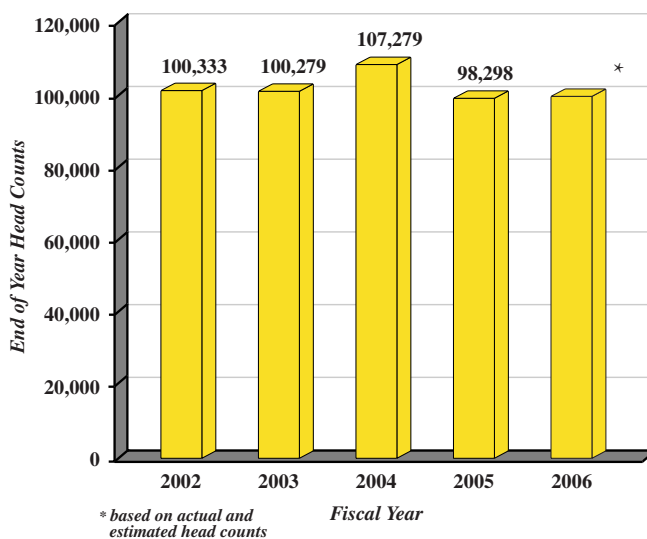


## — HUMAN CAPITAL RESOURCES —

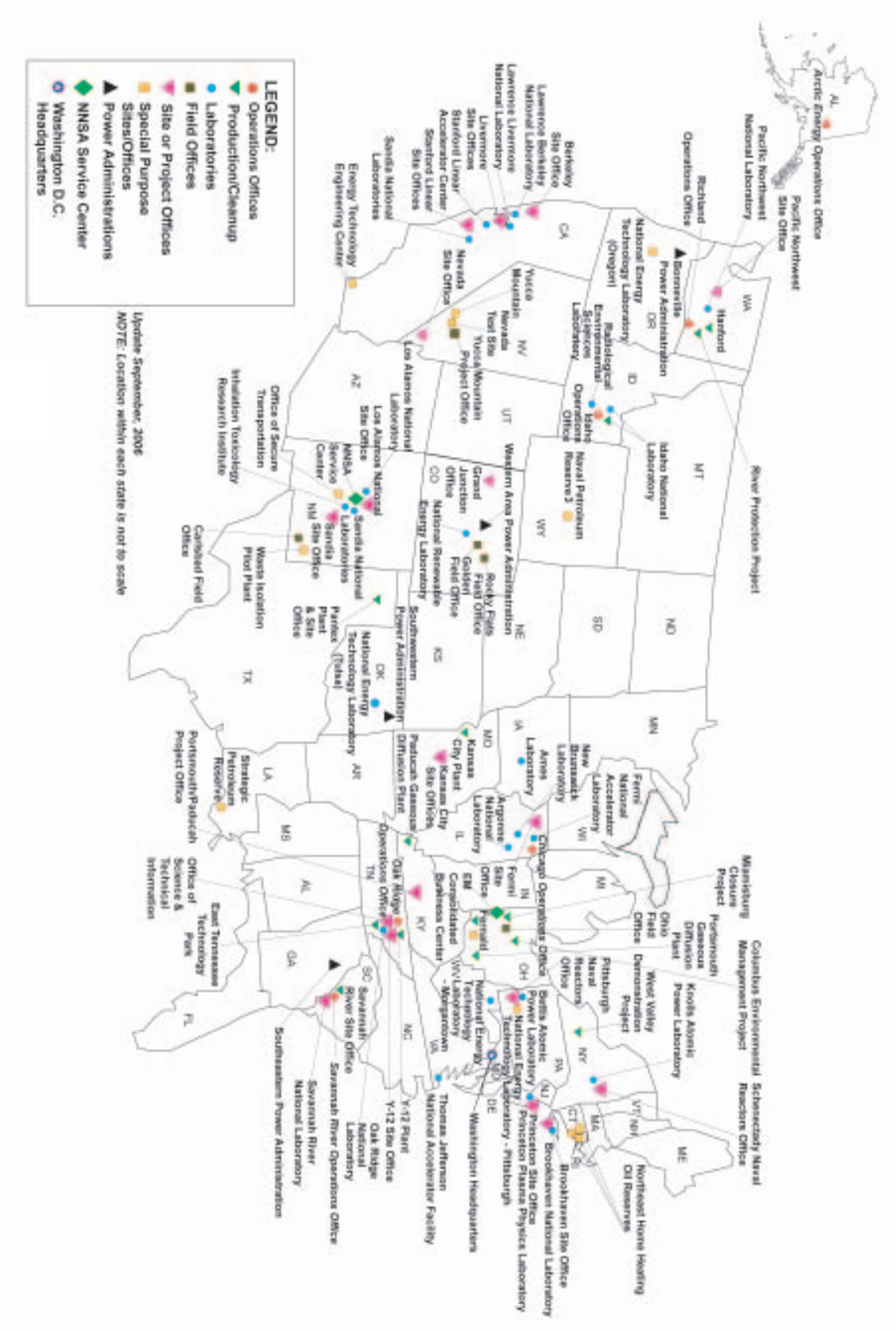
## Federal Employees



## Contractor Employees



— MAJOR DEPARTMENT OF ENERGY LABORATORIES AND FIELD FACILITIES —



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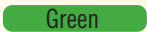
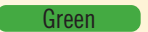






















## — STRATEGIC GOALS —

The Department pursues the following four strategic goals and seven supporting general goals to achieve its mission. The performance, financial and other related information presented in this report is structured around these goals. In FY 2006, the Department renewed and extended its commitment to the DOE mission by updating its Strategic Plan. The new plan will serve as our roadmap in FY 2007 and beyond, addressing five strategic themes: Energy Security, Nuclear Security, Scientific Discovery and Innovation, Environmental Responsibility, and Management Excellence. The plan can be viewed at <http://energy.gov/about/strategicplan.htm>.

Strategic and General Goals	Resources Applied (\$ in millions)	
	 Federal Employees	 Program Costs
<b>Strategic Goal: DEFENSE</b>  To protect our national security by applying advanced science and nuclear technology to the Nation's defense.  <b>General Goals</b> 1 – Maintain nuclear weapons stockpile 2 – Detect and prevent nuclear proliferation 3 – Support nuclear power needs of the U.S. Navy	2,636*	\$ 6,169
<b>Strategic Goal: ENERGY</b>  To protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.  <b>General Goal</b> 4 – Enhance energy security	6,593*	\$ 5,056
<b>Strategic Goal: SCIENCE</b>  To protect our national and economic security by providing world-class scientific research capacity and advancing scientific knowledge.  <b>General Goal</b> 5 – Maintain a world-class scientific research capacity	949*	\$ 2,517
<b>Strategic Goal: ENVIRONMENT</b>  To protect the environment by providing a responsible resolution to the environmental legacy of the Cold War and by providing for the permanent disposal of high-level radioactive waste.  <b>General Goals</b> 6 – Clean up contamination of sites 7 – Establish a permanent repository for high-level radioactive waste.	1,765*	\$ 4,713

\* These Federal Employee numbers do not include the combined 2,911 Federal Energy Regulatory Commission and Corporate Management employees (e.g. CFO, General Counsel, etc.) that support the above four strategic goals.

## — PERFORMANCE AND ACCOUNTABILITY REPORT CARD —

Score	Requirement or Initiative	Supporting Indicators				
	Government Management Reform Act – Financial Statement Audit	Audit Opinion – Overall Disclaimer of opinion with a Qualified Opinion on the Balance Sheet				
	Federal Managers’ Financial Integrity Act – Management Controls (Section II) Financial Systems (Section IV)	No material weaknesses (Section II) Financial systems generally conform to (Section IV) requirements				
	OMB Circular A-123, Appendix A	Implementation  Remediation 				
	Federal Financial Management Improvement Act	Financial Management Systems Evaluation identified a non-compliance				
	Federal Information Security Management Act	No Significant Deficiencies Reported				
	Improper Payments Information Act	<1% Erroneous Payment Rate Not Considered Significant Risk by OMB				
	President's Management Agenda Scorecard	Status		Progress		
	Human Capital	TBD		TBD		
	Competitive Sourcing					
	Financial Performance Improvement					
	E-Government					
	Budget & Performance Integration					
	Federal Real Property Asset Management					
	Performance Results:					
	Defense Strategic Goal	 Yellow				
	General Goal 1: Nuclear Weapons Stewardship	 Yellow				
	General Goal 2: Nuclear Nonproliferation	 Yellow				
	General Goal 3: Naval Reactors	 Green				
	Energy Strategic Goal	 Green				
	General Goal 4: Energy Security	 Green				
	Science Strategic Goal	 Green				
	General Goal 5: Science	 Green				
	Environment Strategic Goal	 Green				
	General Goal 6: Environmental Mgmt	 Green				
	General Goal 7: Nuclear Waste	 Green				
		Certificate of Excellence in Accountability Reporting	Awarded for FY 2004 PAR Report			
		Mercatus Performance Scorecard Ranking	Ranking	FY 2003	FY 2004	FY 2005
			12	6	9	

# PERFORMANCE GOALS, OBJECTIVES AND RESULTS

## — PROGRAM PERFORMANCE —

The Department continues to work toward the goals established in our September 2003 *Strategic Plan*. The following sections focus on progress made toward the Department's four strategic goals: Defense, Energy, Science and Environment. The Department's progress toward these strategic goals is described within the context of outcome-based general goals and program goals, and key, output-based annual performance targets. Programmatic benefits to the public are discussed, as are external factors that may potentially impact achievement of the Department's goals.

Additional detailed performance progress is provided in the Performance Results section and provides the year-end assessment of each annual performance target for FY 2006, performance information for the past three fiscal years (FY 2003-2005), and progress on performance targets that were not previously met.

### Performance Management Framework

The Performance Management Framework illustrates the hierarchical relationship of performance elements within the Department. During performance planning, high-level goals direct the scope of elements that lie below; consequently, progress against these goals is indicated by actual performance at the lower levels. Each of these performance elements are described below.

**Mission** – The Department of Energy's mission is to advance the national economic and energy security of the United States; to promote scientific and technological innovation in support of that mission; and to ensure the environmental cleanup of the national nuclear weapons complex.

**Strategic Goals** – The Department has four strategic goals that support the achievement of this mission. A strategic goal is a statement of aim or purpose that may not be directly measurable. Strategic goals are used by the Department to guide the creation of general goals and program goals, which are focused on producing outcomes that support the Department's mission.

**General Goals** – The Department has seven long-term general goals that support the four strategic goals. A general goal defines more specifically what the Department plans to achieve in carrying out its mission over a period of time. General goals are expressed as outcomes, which allow for a future assessment of progress toward the goal.

**Program Goals** – Outcome-based program goals bridge the gap between long-term general goals and annual performance targets. In

2006, the Department tracked 54 program goals, spread across Departmental administrations and offices. Because they are focused on the core missions of the administrations and offices to which they are assigned, program goals are critical mid-term indicators of Departmental performance.

**Annual Performance Targets** – In an effort to reduce the number of performance measures to the critical few, the Department monitored 204 annual performance targets in FY 2006 in contrast with 248 in FY 2005. These targets establish a measurable performance baseline against which actual achievement may be assessed. Annual performance targets may be either outcomes or outputs.






### Performance Scorecard

Each Strategic Goal section in the FY 2006 *Performance and Accountability Report* includes a Performance Scorecard. This depiction reveals both cost (program costs and budgetary expenditures) and performance information in a consolidated presentation.

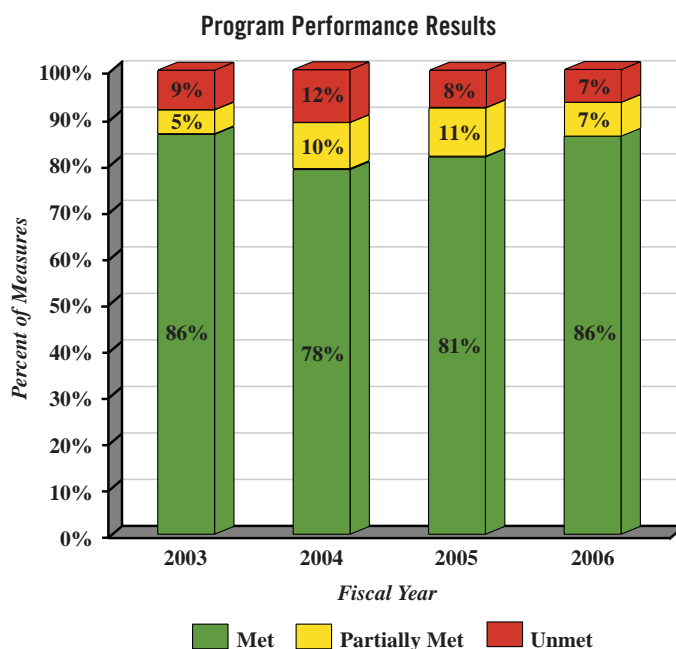
Program costs are defined as full period costs computed using the accrual basis of accounting that recognizes expenses when incurred regardless of when the related budgetary expenditures are made. Budgetary expenditures represent the goods and services received during the current year for which the Department has paid or will be required to pay in the future. It is important to note that the budgetary expenditures will not equal program costs in any particular year because there are significant timing differences between accrued cost and recognition of budgetary expenditures. For example, an asset with a useful life of ten years, purchased in the current year, would have its full cost recognized as a budgetary expenditure, while its full cost for accounting purposes would be spread over its ten-year useful life. Conversely, an unfunded liability recorded in the current year would be recognized as a program cost in the current year, yet would not be recognized as a budgetary expenditure until funding is made available to liquidate the liability.

Performance information is presented for program goals associated to the strategic goal. Actual performance against annual performance targets is recorded on a quarterly basis in Joule, the Department's performance measurement tracking system. These results indicate progress toward associated program goals, and ultimately its general and strategic goals. Performance goals and targets are assessed as Green, Yellow or Red. The definitions used for assessing annual targets and program goals are as follows:

Program Goals	Annual Targets	
≥ 90% Met	100% Met	
≥ 80% Met; < 90% Met	≥ 80% Met; < 100% Met	
< 80% Met; or Undetermined	< 80% Met; or Undetermined	

Program goals and annual targets are assessed differently to provide managers a reasoned approach to performance assessment. Because program goal assessments are based on a roll-up of annual targets, it is important to put the impact of unmet targets in the proper perspective at the program goal level.

The Department adjusts its management strategies each year, as necessary, based on actual performance, current resources, and the national energy and economic outlook. This ensures that the Department is continuously fulfilling its mission.



## Performance Validation and Verification

Validation and verification of the Department's performance is accomplished by certifications, periodic reviews, and audits. The Department's end-of-year reporting process includes certifications by heads of program elements that the reported results are accurate.

The results are internally reviewed by the Department for quality and completeness, while key internal controls related to performance reporting are considered by the Department's independent auditors. Source data substantiating performance target results is maintained by the program offices, the National Laboratories, and the Department's contractor work force. Due to the size and diversity of the Department's portfolio, validation and verification is also supported by the following activities

**Budget Preparation Analysis:** Validating and verifying program contributions to the Department's strategic and general goals are a routine part of reviewing and analyzing the annual performance budget submission. Performance targets submitted at each phase of budget development are also reviewed to ensure that they contribute effectively to the achievement of the program and Departmental goals.

**Internal Controls:** Training and other forward-looking actions have helped the Department maintain a strong commitment to internal controls that serve to enhance validation and verification of program performance. For example, the Department provides quarterly training that addresses areas such as internal controls over performance measurement, the relevance and meaningfulness of performance targets, and the auditability and accuracy of reported performance results.

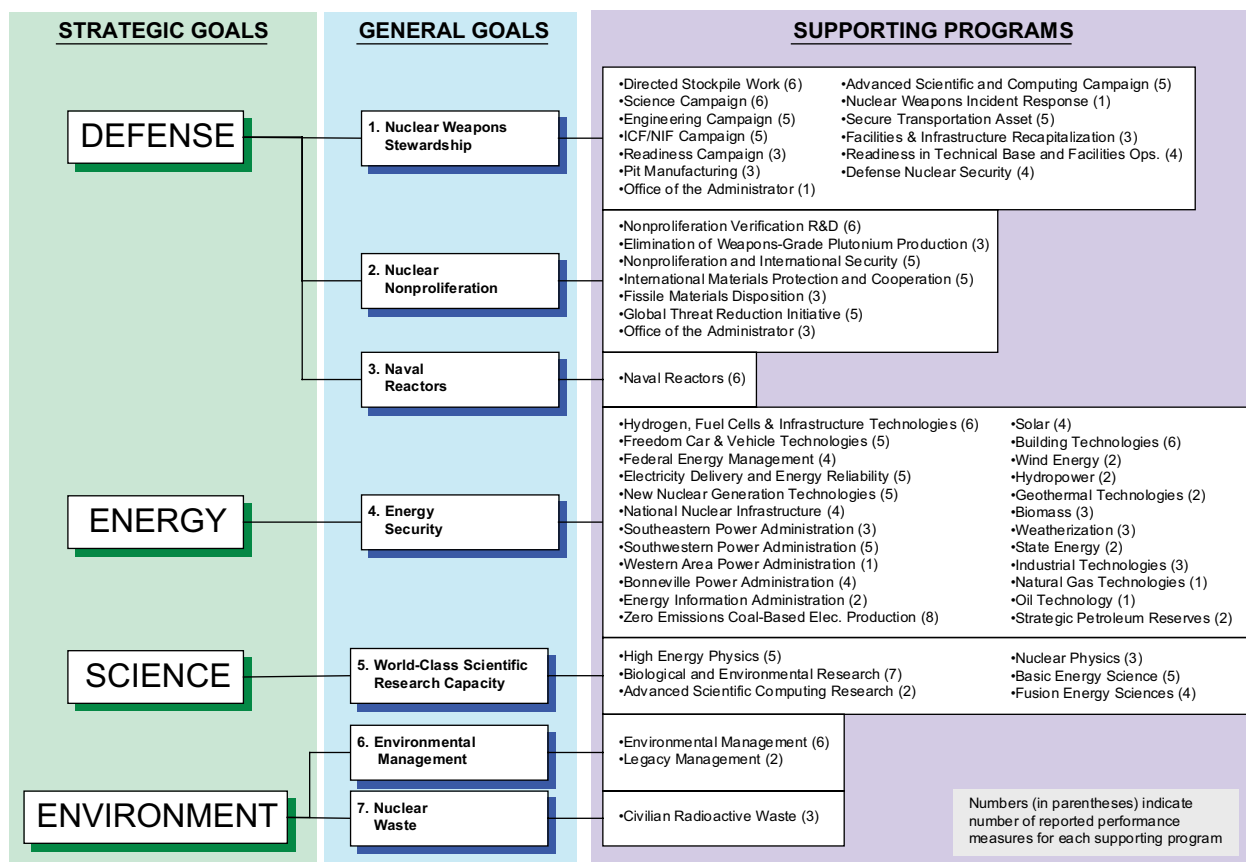
**Automated Systems:** Tracking and evaluating program performance is accomplished by an automated system known as Joule. The system allows for remote data entry of quarterly performance results by Departmental administrations and offices, as well as remote monitoring and oversight by Headquarters. Joule provides the end-of-year performance information that is included in the PAR.

**External Independent Analysis:** Assessing program performance is also conducted by OMB through use of its Program Assessment Rating Tool (PART). PART results reveal that a majority of the Department's assessed programs periodically initiate independent evaluations to gauge program effectiveness and to support program improvements. Departmental programs and activities are also reviewed and audited on an on-going basis by the Department's Office of Inspector General (<http://www.ig.doe.gov/reports.htm>) and the Government Accountability Office (<http://www.gao.gov/index.html>).

**Management Reviews:** Evaluating the effectiveness of established internal controls is a requirement of the FMFIA Act of 1992. Accordingly, the Department performs annual evaluations of its internal controls to provide reasonable assurance that they are working effectively; that program and administrative functions (including the accuracy and reliability of the reporting of performance results) are performed in an economical and efficient manner consistent with applicable laws; and that the potential for waste, fraud, abuse or mismanagement of assets is minimized.

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## — DOE STRATEGIC AND GENERAL GOALS AND SUPPORTING PROGRAMS —



### Program Assessment Rating Tool (PART)

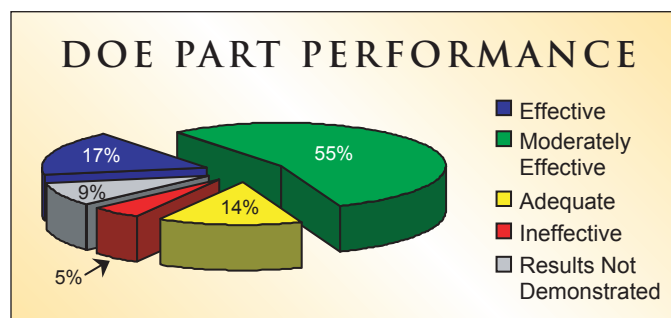
PART was developed by OMB in FY 2002 as a key component for implementing the PMA, particularly the Budget and Performance Integration initiative. PART grew out of the Administration's desire to provide federal agencies with a disciplined tool for assessing program planning, management, and performance against quantitative, outcome-oriented goals. As an instrument for periodically evaluating the efficiency and effectiveness of federal programs, PART enables managers to identify and rectify real and potential problems associated with program performance.

The Department has completed official assessments for 94 percent of its available programs through FY 2006, putting it well-ahead of OMB's implementation schedule for the federal government. Of these 72 percent are rated as "Moderately Effective" or "Effective." More information on PART scores and OMB's findings are available at <http://www.whitehouse.gov/omb/expectmore/index.html>.

PART provides a pathway for the Department and OMB to agree upon meaningful long-term and annual targets for each program. As programs are newly assessed and reassessed, program goals and annual performance targets will be consistent with long-term goals and annual goals tracked within PART.

Ultimately, the PART is designed to be an iterative process, capable of tracking the evolution of program performance over time through periodic reassessments. Key to this process are the recommendations that OMB develops during the assessment process to foster program improvement. Actions taken toward implementing PART recommendations are tracked by Offices and reported to OMB semi-annually. To see the Department's assessment of PART recommendations developed as part of the FY 2006 PART cycle (conducted during calendar year 2004) please refer to the previously identified website.

The on-going implementation and review of PART recommendations, coupled with the utilization of performance information derived from assessments and periodic reassessments, signify the PART as an integral process for planning and budget decision-making, as opposed to a set of one-time program evaluations. The Department will continue to make good use of this tool to ensure mission success.



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— DEFENSE —

— MEETING NATIONAL SECURITY CHALLENGES —

TO PROTECT OUR NATIONAL SECURITY BY APPLYING ADVANCED SCIENCE  
AND NUCLEAR TECHNOLOGY TO THE NATION'S DEFENSE.

One of the primary responsibilities of the Department is to enhance national security through the application of nuclear technology. To accomplish this goal the Department oversees:

- Maintenance and certification of the U.S. nuclear weapons stockpile,
- Development of responsive infrastructure that can adapt quickly to stockpile changes while still drawing down the stockpile of weapons excess to defense needs,
- Security of the nuclear complex, strengthening of international nuclear nonproliferation controls,
- Reduction in global danger from weapons of mass destruction, and
- Provision to the U.S. Navy of safe and effective nuclear propulsion systems.

The National Nuclear Security Administration (NNSA), a semiautonomous agency within the Department, is responsible for these activities critical to our national security.

### General Goal 1: Nuclear Weapons Stewardship

*Ensure that our nuclear weapons continue to serve their essential deterrence role by maintaining and enhancing the safety, security, and reliability of the U.S. nuclear weapons stockpile.*

One of the most important responsibilities of the Secretary of Energy, in cooperation with the Secretary of Defense, is certifying to the President that the Nation's nuclear weapons stockpile is safe, secure, and reliable. To do so, the NNSA:

- Maintains a nuclear weapons stockpile surveillance and engineering capability,
- Refurbishes and extends the lives of selected nuclear systems, and
- Maintains a science and technology base, including the ability to restore the manufacturing infrastructure for the production of replacement weapons, should the need arise.

These capabilities ensure the vitality of our nuclear weapons without the need for underground nuclear testing.

— DEFENSE PERFORMANCE SCORECARD — (\$ in millions)									
General Goals and Scores	Program Costs		Programs and Scores		FY 2006 Budgetary Expenditures Incurred *				Performance of Annual Targets
	FY 2006	FY 2005			Met (100%)	Met (≥ 80%)	Met (< 80%)	Undetermined	
1. Nuclear Weapons Stewardship	\$6,792	\$6,779	Directed Stockpile Work	R	\$	2	2	0	
			Science Campaign	G	\$	6	0	0	
			Engineering Campaign	G	\$	5	0	0	
			Inertial Confinement Fusion Ignition and High Yield (ICF) Campaign	Y	\$	4	0	1	
			Advanced Simulation and Computing Campaign (ASC)	Y	\$	4	1	0	
			Pit Manufacturing and Certification Campaign	Y	\$	2	1	0	
			Readiness Campaign	G	\$	3	0	0	
			Readiness in Technical Base and Facilities Operations and Maintenance (RTBF)	G	\$	4	0	0	
			Secure Transportation Asset (STA)	Y	\$	2	3	0	
			Nuclear Weapons Incident Response (NWIR)	Y	\$	0	1	0	
			Facilities & Infrastructure Recapitalization Program (FIRP)	G	\$	3	0	0	
			Defense Nuclear Security	G	\$	2	1	1	
			Office of the Administrator **	G	\$	1	0	0	
			Nonproliferation and Verification R&D	G	\$	6	0	0	
2. Nuclear Non-Proliferation	\$1,215	\$1,191	Elimination of Weapons-Grade Plutonium Production (EWGPP)	Y	\$	2	1	0	
			Nonproliferation and International Security (N&IS)	G	\$	5	0	0	
			International Nuclear Materials Protection and Cooperation	Y	\$	3	2	0	
			Fissile Materials Disposition	G	\$	3	0	0	
			Global Threat Reduction Initiative (GTRI)	Y	\$	3	2	0	
			Office of the Administrator **	G	—	—	—	—	
			Naval Reactors	G	\$	6	0	0	
3. Naval Reactors	\$782	\$810	Naval Reactors	G	\$	6	0	0	
Total Cost	\$8,789	\$8,780			\$	66	14	4	0

\* Includes capital expenditures but excludes such items as depreciation, changes in unfunded liability estimates and certain other non-fund costs, and allocations of Departmental administration activities.  
\*\* Program goal and associated annual targets are shared by General Goal 1 and 2.

## — How We Serve the Public

Each year the NNSA certifies the readiness of 100 percent of the strategically deployed nuclear weapons, an activity necessitated when the United States stopped development and production of new nuclear warheads following the end of the Cold War and established a moratorium on nuclear testing. To this end, the Department adopted a science-based Stockpile Stewardship Program (SSP) that emphasizes development and application of greatly improved technical capabilities to assess the safety, security, and reliability of existing nuclear warheads without the use of nuclear testing.

In FY 2006, NNSA announced the details of the Nuclear Weapons Complex 2030, a comprehensive plan to enhance our capability to respond to changing national and global security challenges. For the Nuclear Weapons Complex 2030, NNSA plans to employ a smaller, safer and more secure nuclear weapons stockpile that has assured reliability over the long term, and is backed by the industrial and design capabilities needed to respond to changing technical, geopolitical or military needs. This plan will facilitate the President's vision for the smallest stockpile consistent with our national security needs.

During FY 2006, NNSA started a number of major activities for the Nuclear Weapons Complex 2030. NNSA engaged two teams from the nuclear weapons labs—one from Los Alamos and another from Livermore, both supported by Sandia National Laboratory—in a Reliable Replacement Warhead (RRW) design. If RRW is technically feasible, NNSA will seek authorization to proceed to engineering development and production. Also in support of the Nuclear Weapons Complex 2030, NNSA accelerated warhead dismantlements to enhance readiness of the remaining stockpile, assure other nations we are not building up our stockpile, and reduce the security risks associated with safeguarding retired weapons. NNSA established an office within Defense Programs both to drive change and lead nuclear weapons complex transformation. NNSA began managing risk more effectively in R&D and production activities by employing cost-benefit analysis and risk-informed decisions. NNSA started distributed production centers of excellence at the current production complex to include transition of all R&D and production involving quantities of plutonium (except sub-critical experiments at the Nevada Test Site) to a single site—a consolidated plutonium center—in the early 2020s.

### ***Reliable Replacement Warhead***

The concept for RRW is in contrast with the Cold War design constraints that maximized yield to weight ratios. RRW will facilitate design replacement components that are easier to manufacture; are safer and more secure; are less environmentally dangerous, and contain fewer reactive and unstable materials; and increase design margins thus ensuring long-term confidence in reliability and a correspondingly reduced chance for conducting a nuclear test for stockpile confidence. RRW will provide leverage for a more efficient and responsive infrastructure and opportunities for a smaller stockpile. During the decade or more needed to complete the transition to an RRW, legacy warheads must be supported through associated life extension programs.



### ***Responsive Infrastructure***

The envisioned 2030 infrastructure to support the stockpile will have the following characteristics:

- strengthened, but consolidated R&D infrastructure;
- modernized production complex with a consolidated plutonium center and increased production throughput;
- consolidated nuclear materials at fewer sites and fewer locations within sites, and
- streamlined business practices, including a more effective approach to managing risks.

NNSA undertook several steps in FY 2006 to start the transformations required for the Reliable Infrastructure. Major scientific and experimental facilities, such as the National Ignition Facility (NIF) and the Dual-Axis Radiographic Hydrotest (DARHT) facilities are being converted into national, shared user facilities managed to benefit the entire complex and to eliminate redundant capabilities and programs reflected in today's complex. The NIF is designed to create and measure extreme temperature and pressure conditions of a simulated nuclear explosion. DARHT is designed to provide x-ray images of weapons implosion processes, supporting weapons certification and assessment.

### ***Performance Against Key Targets***

The NNSA ensures that the nuclear warheads and bombs in the U.S. nuclear stockpile are safe, secure, and reliable by:

- Developing solutions to extend weapon life and correcting potential technical issues;
- Conducting scheduled warhead/bomb maintenance;



**Inside Out:** The interior of the National Ignition Facility target chamber at the Lawrence Livermore National Laboratory.

- Dismantling warheads/bombs retired from the stockpile;
- Conducting evaluations to certify warhead/bomb reliability and to detect/predict potential weapon fixes, mainly from aging;
- Producing and refurbishing warheads/bombs to install the life extension solutions and other fixes; and
- Researching advanced concepts to serve their essential deterrence role by maintaining and enhancing the safety, security, and reliability of the U.S. nuclear weapons stockpile.

During FY 2006, the NNSA:

- Assured that 100 percent of the nuclear warhead stockpile is safe, secure, reliable and available. This activity, conducted jointly with the Department of Defense (DoD), is critically important to U.S. national security in the absence of underground nuclear weapon testing, which has been banned by U.S. adherence to the 1992 moratorium.
- Completed 34 to 40 percent of the life extension programs for the B61-7/11 for the F15 and F16 fighter jets and W76-1 for the Trident submarine. Extending the life of existing weapons has been a cost effective way to provide nuclear security.

- Completed 60 percent of the DARHT facility to provide data required to certify the safety and reliability of the U.S. nuclear weapons stockpile.
- Completed 87 percent of the construction of the 192-laser beam NIF, as targeted. The NIF also provides data required to certify the safety and reliability of the U.S. nuclear weapons stockpile.
- Achieved a maximum individual computing production platform of 94 trillion operations per second. This capability, part of the Advanced Simulation Computing Campaign, will ultimately help conduct nuclear stockpile certification for all weapons systems by using highly complex, three dimensional simulations.
- Completed 96 percent of the Tritium Extraction Facility within the cost estimate, as targeted. This facility is designed to extract and refresh tritium in a nuclear weapon.
- Reduced deferred maintenance within the nuclear weapons complex by funding the \$118 million project as part of the Facilities and Infrastructure Recapitalization Program, meeting the annual target. To date, 28 percent of the \$1.2 billion in deferred maintenance has been addressed.
- Trained personnel provided equipment and ensured security plans for responding to and mitigating nuclear and radiological incidents worldwide. The program overcame personnel and equipment shortage to deliver an 82 percent Emergency Operations Readiness Index in FY 2006.
- Completed 93 secure convoys of special nuclear material to meet DOE, DoD, and other customer requirements, using advanced equipment and highly trained personnel. In response to the deferral of DOE's Environmental Management work until FY 2007, NNSA coordinated with other customers to increase shipments in order to avoid future backlogs.

### — External Factors

The following external factors could affect the Department's ability to achieve this goal:

**Technology:** Technological development is inherently unpredictable. The discovery of an insurmountable scientific or engineering obstacle in a credible science-based stockpile stewardship program could force the resumption of underground nuclear testing.

**Nuclear Threats:** Changes in the nuclear threats posed to the United States could require changes to our nuclear weapons stewardship programs.

### General Goal 2: Nuclear Nonproliferation

*Provide technical leadership to limit or prevent the spread of materials, technology, and expertise relating to weapons of mass destruction; advance the technologies to detect the proliferation of weapons of mass destruction worldwide; and eliminate or secure inventories of surplus materials and infrastructure usable for nuclear weapons.*



**Uranium:** Highly Enriched Uranium (HEU) is down-blended with other forms of uranium to produce Low Enriched Uranium (LEU), suitable for commercial, civilian purposes.

To implement its mission, the NNSA:

- Secures nuclear materials, nuclear weapons, and radiological materials at potentially vulnerable sites in Russia and elsewhere,
- Reduces quantities of nuclear and radiological materials,
- Bolsters border security overseas,
- Strengthens international nonproliferation and export control regimes,
- Downsizes the nuclear weapons infrastructure of the former Soviet Union (FSU),
- Mitigates risks at nuclear facilities worldwide, and
- Conducts cutting-edge nonproliferation and national security R&D.

#### — *How We Serve the Public*

The NNSA reduces the threat posed by the proliferation of fissile material by helping to secure domestic and foreign stockpiles of weapons-grade material. In addition, the NNSA oversees the dismantlement, destruction, and ultimate disposition of weapons including the down-blending of highly-enriched uranium (HEU) or the burning of plutonium as mixed oxide (MOX) fuel in nuclear energy plants. The NNSA further reduces risk through controlling exports of nuclear-related technologies, monitoring borders for the movement of fissile materials, and ensuring the employment of foreign nuclear-related scientists and engineers in other more productive pursuits. A number of FY 2006 activities directly serve the public.

- In support of the Global Nuclear Energy Partnership (GNEP), launched in February 2006, NNSA will coordinate with DOE's Office of Nuclear Energy on integrating safeguards and security protocols into the development of advanced fuel cycle technologies. NNSA will support the maturation of incentives that contribute to GNEP, including fuel cycle services, international cooperation on safeguards, security and peaceful nuclear uses, and improved international nonproliferation controls.
- Also during FY 2006, site preparation began on the MOX Fuel Fabrication Facility at Savannah River Site. The MOX facility will convert surplus weapon-grade plutonium to MOX fuel used for reactors, thus eliminating its availability for nuclear weapons and reducing the threat of terrorists or rogue nations obtaining nuclear weapon materials by converting it to a fuel for use in existing nuclear reactors.

- Other non-proliferation activities include NNSA's successful "Megaports" initiative which installs sophisticated radiation detection equipment at many of the world's international ports. This initiative, in conjunction with the Second Line of Defense program, provides detection systems at vulnerable seaports, airports and other land border crossings worldwide in order to minimize the risk of nuclear proliferation and terrorism through detection and deterrence of illicit trafficking in plutonium, HEU and other radioactive materials at international borders. Defense Nuclear Nonproliferation (DNN) has made steady progress on the Megaports Initiative since the program's beginning in FY 2003. As of 2006, the Megaports initiative is currently operational in six countries: Greece, the Bahamas, Sri Lanka, the Netherlands, Singapore, and Spain. DNN is at various stages of implementing the program in the following countries: Belgium, China, Dominican Republic, Dubai, Egypt, Honduras, Israel, Jamaica, Oman, the Philippines, Taiwan and Thailand.

#### — *Performance Against Key Targets*

The Department draws from its world-class scientific and technical expertise, and leverages existing nonproliferation programs to identify and prioritize vulnerable materials, remove or secure such materials, convert research and test reactors, and take any other steps necessary to meet changing threats. Much of NNSA's nonproliferation work is conducted abroad. Uncertainties in this operating environment impact the completion of NNSA's annual goals, most notably the construction of fossil fuel plants to eliminate weapons grade plutonium production in Russia and the FSU, and installation of Second Line of Defense sites in Russia and other regions of concern.

During FY 2006, the NNSA:

- Completed almost 50 percent of the refurbishment of a fossil fuel plant in Seversk, Russia. When complete, this plant — along with the construction of another plan in Zheleznogorsk, Russia — will provide an alternative fossil fuel power source permitting the shutdown of three nuclear reactors, which currently produce up to 1.2 metric tons of weapons-grade plutonium annually.
- Progressed on the facility and equipment design, construction, and cold start-up activities for the U.S. MOX facility. As planned, 17 percent of the work associated with this facility was completed by the end of FY 2006. MOX facilities support nuclear nonproliferation by reducing the supply of fissile material.
- Installed a cumulative 104 Second Line of Defense sites and 6 Megaport sites, as targeted. The NNSA provides assistance to foreign governments to identify and intercept illegal shipments of weapons materials by working in Russia and other regions of concern.
- Progressed to complete 24 percent of the facility design, construction and cold start-up activities for the Plutonium Disassembly and Conversion Facility. This facility will provide the U.S. with the capability to disassemble surplus nuclear weapons pits and convert the resulting plutonium metal to plutonium oxide, reducing the supply of fissile material.

- Employed 15,900 displaced Russian and FSU experts through Global Initiatives to Prevent Proliferation grants, Nonproliferation and International Security grants, or private-sector jobs, as planned. Employing skilled nuclear-trained professionals in endeavors such as medical technology helps prevent the spread of sensitive knowledge to rogue states.

### — External Factors

The following external factors could affect our ability to achieve this goal:

**Close Cooperation with Russia:** Cooperation between the United States and Russia has made it possible to make great strides in securing and eliminating inventories of surplus materials. A close relationship is necessary for future progress.

**International Atomic Energy Agency:** This agency is essential to the success of our efforts to control nuclear proliferation. It is uncertain whether the agency will receive the necessary funding and show the necessary leadership to member countries. Close monitoring of this situation will continue.

**Technology:** Technological development is uncertain and unpredictable. Our efforts to develop nuclear weapons/material detection technology may be more or less successful than predicted, which would have a corresponding positive or negative impact on our efforts.

### General Goal 3: Naval Reactors

*Provide the Navy with safe, militarily effective nuclear propulsion plants and ensure their continued safe and reliable operation.*

Naval nuclear propulsion plants currently power about 40 percent of the Navy's principal combatants. The NNSA will continue to provide the Navy

and the DoD with reliable and militarily effective nuclear power through the Naval Reactors program. New technologies, methods, and materials to support reactor plant design for future generations of submarines, aircraft carriers, and other combat ships are also developed under this program.

### — How We Serve the Public

NNSA's Naval Reactors program serves the public by providing the Navy with safe, militarily effective nuclear propulsion plants and ensuring their continued safe and reliable operation. This program, which supports the nuclear powered submarines and carriers around the world, remains a vital part of the national security mission and the Global War on Terrorism.

### — Performance Against Key Targets

During FY 2006, the NNSA:

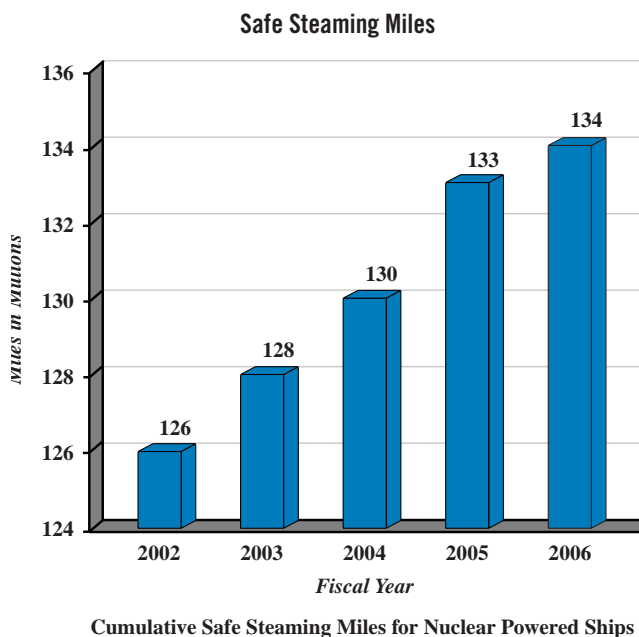
- Achieved 2 million miles of safe steaming in nuclear-powered ships and the design of new reactors. Since its inception, the Naval Reactors program has achieved 134 million miles of safe nuclear propulsion, as shown in the chart below.
- Completed 75 percent of the next generation aircraft carrier reactor design (referred to as the CVN 21). The CVN 21 nuclear propulsion plant will have increased core energy, nearly three times the electrical plant generating capacity, and will require half of the Reactor Department sailors, compared to today's operational aircraft carriers.

### — External Factors

Currently, no external factors appear to impact the ability to achieve this General Goal. However, given the unique nature of the Naval Reactor's responsibilities, commitments to both DOE and the U.S. Navy must be considered at all times. Therefore, any external factor seriously affecting either organization's policies may have an impact on the Program's ability to achieve this goal.



**USS Ronald Reagan:** The nuclear-powered aircraft carrier, USS RONALD REAGAN (CVN 76), being welcomed for the first time in her new homeport, San Diego, California.



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## — ENERGY —

## — INVESTING IN AMERICA'S ENERGY FUTURE —

TO PROTECT OUR NATIONAL AND ECONOMIC SECURITY BY PROMOTING A DIVERSE SUPPLY AND DELIVERY OF RELIABLE, AFFORDABLE, AND ENVIRONMENTALLY SOUND ENERGY.

The demand for energy in the U.S. is rising much faster than the projected increase in domestic energy production. The shortfall between domestic energy demand and domestic supply is projected to increase nearly 50 percent by 2020. That projected shortfall can be made up in only three ways – import more energy, improve energy conservation and efficiency, and/or increase domestic supply.

The Administration considered these options in its development of the National Energy Policy (NEP). It concluded that increased dependence on oil imports from volatile regions of the world would jeopardize our national and economic security. As imports rise, so does our vulnerability to price spikes and surges, shortages, and disruptions. For that reason, the Administration resolved to take steps to improve energy conservation and efficiency, increase domestic energy production, and increase the reliability and security of imports in

order to avoid increased dependence on imports from volatile regions of the world.

Largely consistent with the priorities set forth in the NEP, the President signed the Energy Policy Act into law in August 2005. This law is the first comprehensive energy plan in more than a decade. It encourages energy efficiency and conservation, promotes alternative and renewable energy sources, reduces our dependence on foreign sources of energy, increases domestic production, modernizes the electricity grid, and encourages the expansion of nuclear energy.

Science and technology are the Department's principal tools for achieving the goals of the NEP and the Energy Policy Act (EPACT) of 2005. The Department invests in high-risk, high-value energy research and development (R&D) that the private sector alone would not or could not develop in a market-driven economy.

— ENERGY PERFORMANCE SCORECARD — (\$ in millions)									
General Goal and Score	Program Costs		Programs and Scores		FY 2006 Budgetary Expenditures Incurred *				Performance of Annual Targets
	FY 2006	FY 2005			Met (100%)	Not Met (≥ 90%)	Not Met (< 90%)	Undetermined	
4. Energy Security	\$6,835	\$6,617	Hydrogen, Fuel Cells and Infrastructure Technologies Program	Y	\$ 5	0	1	0	
			Freedom Car & Vehicle Technologies	Y	\$ 4	0	1	0	
			Solar	G	\$ 4	0	0	0	
			Building Technologies	G	\$ 6	0	0	0	
			Wind Energy	Y	\$ 1	0	1	0	
			Hydropower	G	\$ 2	0	0	0	
			Geothermal Technologies Program	G	\$ 2	0	0	0	
			Biomass	G	\$ 3	0	0	0	
			Weatherization Program	G	\$ 3	0	0	0	
			State Energy Program	G	\$ 2	0	0	0	
			Federal Energy Management Program	G	\$ 4	0	0	0	
			Industrial Technologies Program	G	\$ 3	0	0	0	
			Zero Emissions Coal-Based Electricity & Hydrogen Production	G	\$ 8	0	0	0	
			Natural Gas Technologies	G	\$ 1	0	0	0	
			Oil Technology	G	\$ 1	0	0	0	
			Strategic Petroleum Reserve (SPR)	R	\$ 1	0	0	1	
			New Nuclear Generation Technologies	G	\$ 5	0	0	0	
			National Nuclear Infrastructure	Y	\$ 3	0	0	1	
			Electricity Delivery and Energy Reliability	G	\$ 5	0	0	0	
			Southeastern Power Administration	Y	\$ 1	0	2	0	
			Southwestern Power Administration	Y	\$ 4	1	0	0	
			Western Area Power Administration	G	\$ 1	0	0	0	
			Bonneville Power Administration	G	\$ 4	0	0	0	
			Energy Information Administration	G	\$ 2	0	0	0	
Total Cost	\$6,835	\$6,617			\$ 75	1	5	2	

\* Includes capital expenditures but excludes such items as depreciation, changes in unfunded liability estimates and certain other non-fund costs, and allocations of Departmental administration activities.



**Fill Up:** President George W. Bush at a Washington D.C. Shell Station, the first integrated gasoline/hydrogen station in North America. The Department's Hydrogen "Learning Demonstration," brings together automobile makers and energy companies to test fuel cell vehicles and hydrogen fueling systems in real-world conditions.

### General Goal 4: Energy Security

*Improve energy security by developing technologies that foster a diverse supply of reliable, affordable, and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.*

The programs supporting this General Goal follow through with the President's promise for a strong, secure economy, and an energy-independent future. Investments are being made that will benefit the Nation today and in the future, including expanding energy supplies, assessing and addressing energy infrastructure vulnerabilities, and developing energy assurance activities consistent with the NEP and EPACT.

The Department's technologies draw on all of the Nation's available resources: renewable energy sources (including hydropower, wind, solar, bioenergy, and geothermal), nuclear energy, oil, natural gas,

coal, and reductions in demand through conservation and energy efficiency technologies and processes. The Administration believes it is not the role of the Federal Government to choose the energy sources for the country. Instead, its role is to help the private sector develop technologies capable of providing a diverse supply of energy, and to allow the market to decide how much of each energy source is actually used. Diversity of energy sources can help provide stability and guard against price spikes, helping to ensure the Nation's energy security.

#### — Energy Efficiency and Renewable Energy

The Department's Office of Energy Efficiency and Renewable Energy's (EERE) mission is to strengthen America's energy security, environmental quality, and economic vitality through public-private partnerships with the private sector, state and local governments, DOE national laboratories, and universities. These partnerships seek to promote energy efficiency and productivity, bring clean, reliable and affordable energy technologies to the marketplace, and make a difference in the everyday lives of Americans by enhancing their energy choices and quality of life.

## — *How We Serve the Public*

Renewable energy technologies hold tremendous promise in moving the Nation toward sustained, low emission electricity, hydrogen supply, and affordable biofuels. Government-sponsored R&D efforts over recent decades have been very successful in helping to lower costs and improve the reliability of renewable energy technologies, and more can be achieved with robust research and development in the future. The Department's programs address both the supply and demand sides of the energy security equation by ensuring energy security in three general areas:

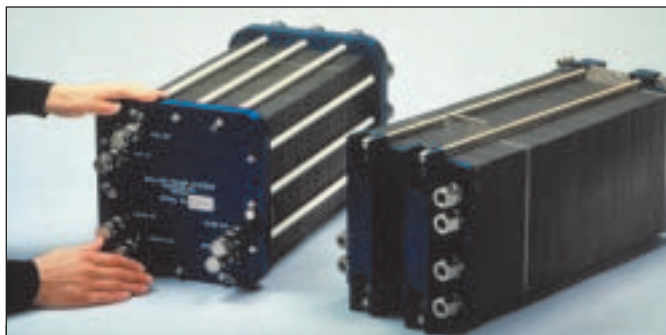
- **Replacement of Conventional Fuels** – The Vehicle Technology and Hydrogen programs work together through the FreedomCAR Partnership and Hydrogen Fuel Initiative as well as the President's Advanced Energy Initiative to develop technologies that, over the next several decades, have the potential to virtually eliminate the use of petroleum for transportation. During FY 2006, six hydrogen refueling stations were opened: in Jamestown, Florida; Oakland, San Francisco, and Sacramento, California; and in Detroit and Taylor, Michigan. These learning demonstration projects address major technical and economic hurdles in electrolyzer technology and distributed hydrogen production that must be overcome to make these technologies a reality.
- **Clean, Affordable Renewable Energy Sources** – The Solar Energy Technology R&D program works to provide clean, reliable, affordable solar electricity for the Nation through its research programs in photovoltaic energy systems, concentrating solar power systems and solar hot water systems. Photovoltaic (PV) technology, for example, makes use of the abundant energy from the sun to convert sunlight directly into electricity for residential and commercial buildings, including power for lights and air conditioning. The Department has continued to demonstrate greater increases in conversion efficiency, and is working to drive down production costs for PV modules.
- **Energy Efficiency and Conservation** – The Weatherization and Intergovernmental Program is the central program for deployment of energy-efficient and renewable energy technologies. Program activities are highly leveraged, permitting even more results than DOE funding alone could achieve. The Program funds energy projects, provides technical assistance, delivers weatherization assistance to low-income families in the United States, and participates in energy and economic development programs overseas. The Weatherization Assistance Program improves the energy efficiency of more than 100,000 low-income homes a year; DOE disburses funds to states, Indian tribes, and the District of Columbia on a formula basis and these entities award funding to local agencies.

## — *Performance Against Key Targets*

During FY 2006, the Department:

- Achieved a modeled technology cost of \$110 per kilowatt for a hydrogen-fueled, 80 kilowatt fuel cell power system, meeting the annual target. The Hydrogen, Fuel Cells, and Infrastructure

Technologies program is conducting R&D to develop hydrogen production, storage, delivery, and fuel cell technologies to the point of being cost and performance competitive and are used by the Nation's transportation, stationary, and portable power industries.



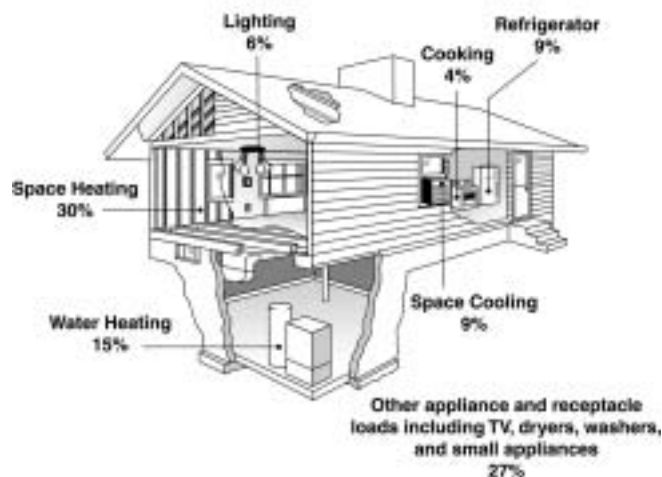
**Fuel Cell:** A fuel cell uses the chemical energy of hydrogen to produce electricity and water, cleanly and efficiently.

- Reduced to \$750 the cost of a high power, light vehicle lithium ion battery, meeting the annual target. The Vehicle Technologies program goal is to develop technologies that enable cars and trucks to become highly efficient through improved hybrid power technologies, cleaner domestic fuels, and lightweight materials, and to be cost and performance competitive. Manufacturers and consumers will use these technologies to help the Nation reduce both energy use and greenhouse gas emissions, thus improving energy security by dramatically reducing dependence on oil.
- Verified, through laboratory testing, the conversion efficiencies of commercial production of 13.8 percent efficient crystalline silicon modules and 11.2 percent efficient thin film modules, meeting the annual target. Improving conversion efficiencies, which represents the percentage of light energy from the sun that is actually converted into electricity, is a key objective for improving the performance of solar energy systems. The Solar program goal is not only to improve performance of solar energy systems but also to reduce development, production, and installation costs to competitive levels as well. This will accelerate large-scale usage across the Nation and make a significant contribution to a clean, reliable, and flexible U.S. energy supply.
- Completed R&D activities that resulted in meeting the following annual targets: a 4.2 cents/kWh cost of energy for large land-based wind systems, 9.3 cents/kWh for large offshore wind systems, and 10-15 cents/kWh for distributed wind systems (under 100 kW), all based on a fixed technology baseline (which differs from current market conditions). The technology acceptance activities led to partial completion of its goal to help facilitate installations of wind energy in 16 states. The Wind Energy Technologies program leads the Nation's R&D efforts to improve wind energy technologies that enhance domestic economic benefits from wind power development. By 2012, the program goal is to complete technology R&D and

collaborative efforts, and to provide technical support and outreach needed to overcome barriers – energy cost, energy market rules and infrastructure, and energy sector acceptance – to enable wind energy to compete with conventional fuels.

- Weatherized over 97,300 homes with DOE funds, and weatherized an additional 100,000 homes using leveraged (combination of DOE, state, and local) funds, meeting the annual target. Made 56 awards to states, the District of Columbia, and the territories in June 2006, making the annual target. Established performance criteria and quality standards and a procedure under which a manufacturer can request that an item be treated as a renewable energy system eligible for the Weatherization Assistance Program, meeting an Energy Policy Act of 2005 milestone.
- Continued its commitment to the appliance and equipment standards program by aggressively addressing the backlog of rulemakings and meeting all of its statutory requirements. The Department published the standards required for support of the EPACT, regarding energy conservation standards for electric distribution transformers, commercial unitary air conditioners and heat pumps, to include residential furnaces and boilers.

### Energy Use in a Low-Income Household



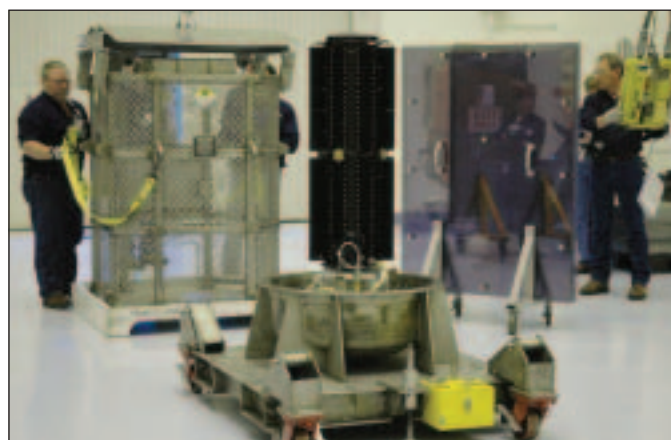
**Since 1999:** DOE has been encouraging the network of weatherization providers to adopt the whole-house approach whereby they attack residential energy efficiency as a system rather than as a collection of unrelated pieces of equipment.

### — Nuclear Energy

The Department's Office of Nuclear Energy (NE) leads the development of new nuclear energy generation technologies and initiatives to meet energy and climate goals and advanced nuclear reactor and fuel cycle technologies that maximize energy from nuclear fuel, while maintaining and enhancing the national nuclear infrastructure.



**Nuclear Power:** The Department is working with industry and the Nuclear Regulatory Commission to lower the risks associated with the deployment of new nuclear power plants in the United States.



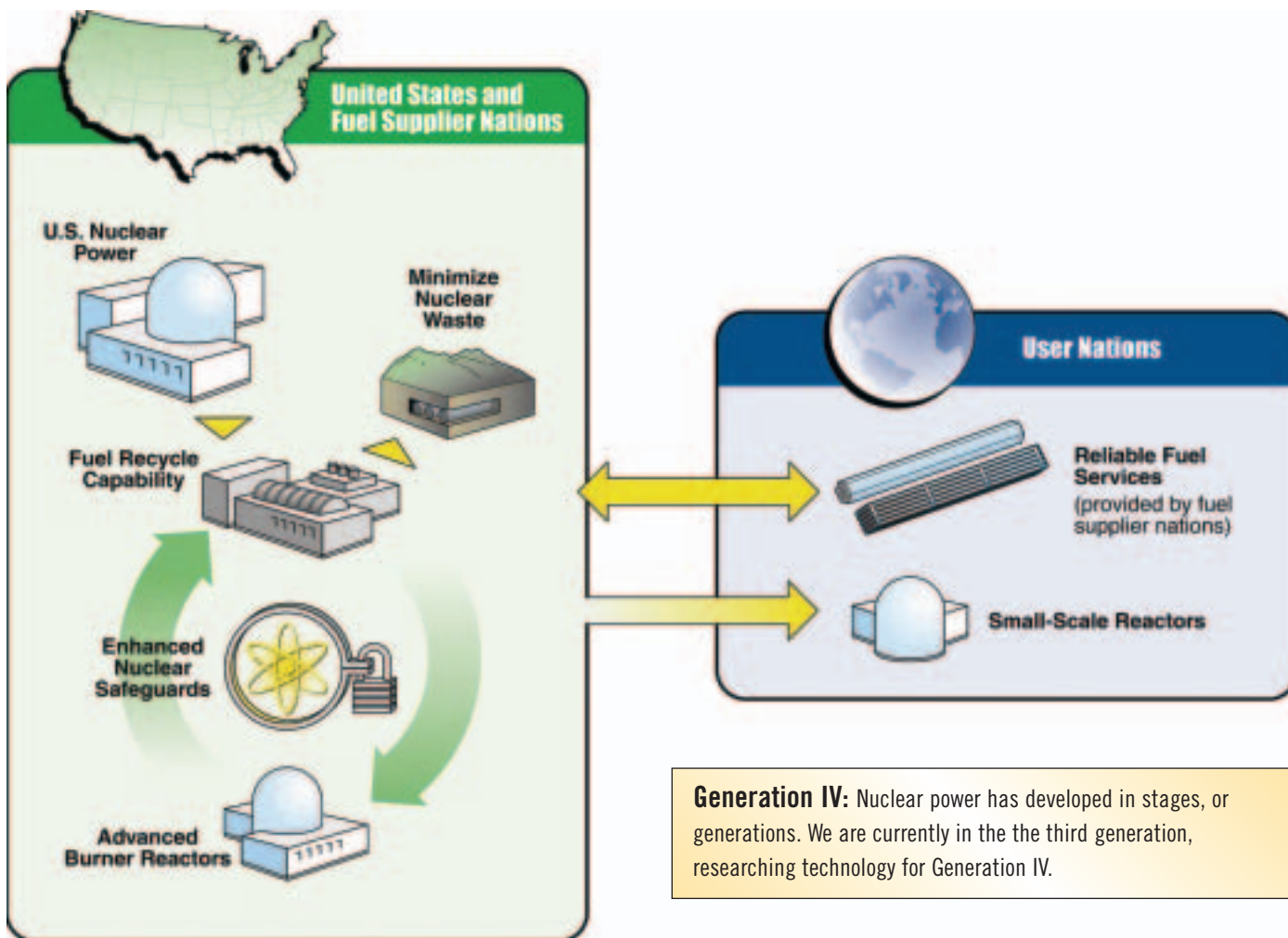
**Going to Pluto:** NE supplied the Radioisotope Thermoelectric Generator (RTG) for the New Horizons Spacecraft, which will be the first spacecraft to visit Pluto and its moon Charon.

### — How We Serve the Public

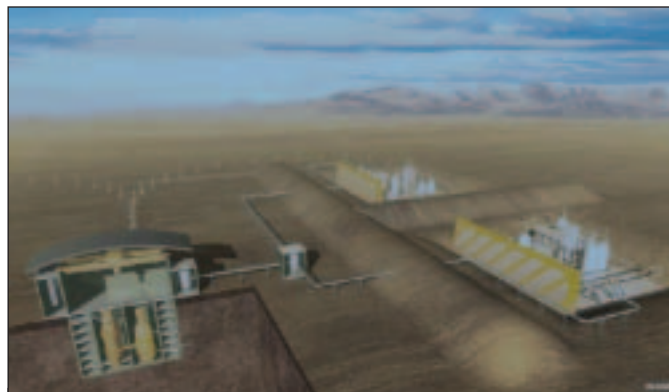
The Department focuses on both the present and future nuclear energy needs of the country through two general activities: (1) development of new nuclear technologies and (2) operation and maintenance of the Department's nuclear infrastructure.

- Benefits realized from DOE's R&D activities include the promotion of nuclear power generation in the United States, advances in waste treatment processes that yield reductions in the volume and long-term toxicity of high level waste from spent nuclear fuel, technologies developed to reduce the long-term proliferation threat posed by civilian inventories of plutonium in spent fuel, and provision of proliferation-resistant technologies to recover the energy content in spent nuclear fuel.

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- As part of President Bush's Advanced Energy Initiative, Secretary of Energy Bodman launched the Global Nuclear Energy Partnership (GNEP) in February 2006. This new initiative is a comprehensive strategy to enable the expansion of economical, carbon-free nuclear energy worldwide by demonstrating and deploying new technologies using a nuclear fuel cycle that enhances energy security while promoting non-proliferation. Coordinated by the NE, GNEP includes the participation of several DOE organizations, including the NNSA and the Office of Civilian Radioactive Waste Management.
- Additional benefits include maintenance and operation of the Department's nuclear infrastructure required to support facilities dedicated to advanced nuclear energy research; to meet the growing demand for isotopes used in medicine, scientific research and homeland security; to provide radioisotope power systems for space exploration and national security; and to ensure the long term future of the domestic nuclear fuel supply.



**Looking Toward a New Generation:** Artist rendering of a nuclear power reactor using Generation IV technologies to produce both electricity and heat for hydrogen production.

## — Performance Against Key Targets

During FY 2006, the Department:

- Focused on R&D activities associated with materials and fuels testing necessary for determining the design of the next generation nuclear power plant. Successful achievement of the target moves the program closer to selecting a design by FY 2011, which is necessary to the development and deployment of next-generation advanced reactors by 2025.
- Focused on R&D activities associated with thermo-chemical processes designed to demonstrate the viability of using heat and/or electricity from next generation nuclear energy systems to produce hydrogen at a cost competitive with other alternative fuels. Successful achievement of the target directly contributes to the goals of the Department's Hydrogen Posture Plan, and contributes to the design of the next generation nuclear power plant.
- Focused on R&D activities associated with advanced separations and fuels testing and initiating conceptual design work on an advanced fuel cycle facility. Successful achievement of the target increases our understanding of the nuclear fuel cycle. These activities directly contribute to the GNEP.
- Focused on activities associated with achieving Nuclear Regulatory Commission certification of two advanced nuclear reactor designs, and the review and certification of industry baselines for combined Construction and Operating Licenses (COLs) for new nuclear power plants. Achievement of the annual target moves the program closer toward enabling an industry decision to deploy new nuclear power plants by 2010. The independent baseline review of the NuStart and Dominion COL projects was completed in June 2006, with the report issued in July 2006.
- Maintained operability of key Departmental nuclear facilities to enable accomplishment of NE and other Departmental program milestones. Successful achievement of the annual target represents an assurance that the Department's unique nuclear infrastructure, required for advanced nuclear energy research and technology development, is available to support national priorities.



**Fuel Cells:** GE prototype for radial stacked planar solid oxide fuel cells.

## — Fossil Energy

The Department's fossil energy's activities are designed to ensure that the economic benefits from moderately priced fossil fuels and a strong domestic industry that creates export-related jobs are compatible with the public's expectation for exceptional environmental quality and reduced energy security risks.

### — How We Serve the Public

Fossil fuels are an indispensable part of the U.S. and global energy mix. The Nation relies on fossil fuels for about 85 percent of the energy it consumes and forecasts indicate that this percentage will continue to increase in the future. The current U.S fossil research portfolio is structured to address this situation, providing a fully integrated program with mid- and long-term market entry offerings. The principal goal is the demonstration of a zero emissions, coal-based electricity generation plant that has the ability to co-produce low-cost hydrogen by 2015. The mid-term manifestation of that goal is expected to be the FutureGen project, a \$1 billion venture with industry that will combine electricity and hydrogen production. This project will use a combination of efficiency improvements and carbon capture and storage to eliminate virtually all emissions of air pollutants, including sulfur dioxide, nitrogen oxides, mercury and carbon dioxide. This prototype power plant will serve as the test bed for proving the most advanced technologies, such as hydrogen fuel cells.

Fossil energy activities also focus on increasing the availability of natural gas and oil. To accomplish this goal, technologies will be developed to increase domestic supplies from unconventional gas resources. Government participation in this effort is required because independent operators, who drill the majority of domestic wells, do not have the resources to develop and implement such technologies. The Department also maintains the Strategic Petroleum Reserve, which guards against the adverse economic impact of a major petroleum supply interruption to the United States, helping to ensure the Nation's energy security.

## — Performance Against Key Targets

During FY 2006, the Department:

- Conducted initial pilot scale slipstream field testing of technology capable of 90 percent mercury removal. Field testing is a critical step toward developing high performance mercury removal technology that help enable coal fired power plants to economically reduce emissions.
- Initiated construction and testing of advanced gas separation technologies. In FY 2006, the Gasification Technologies program moved gas separation, including ceramic membrane, hydrogen separation, carbon dioxide hydrate formation and ceramic membrane air separation, closer to commercialization, which will eventual lead to capital cost reductions of \$60-\$80 per kW from the baseline of \$1,200/kW for Integrated Gasification Combined Cycle systems and efficiency improvements of >1 efficiency points.

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**HTDS:** RTI's High Temperature Desulfurization System installed at the Eastman Chemical Company.

- Performed pilot-scale testing and laboratory testing of different carbon dioxide capture technologies. This testing will lead to significant improvement in cost and performance, and initiate field sequestration activities within the regional partnerships leading to future sequestration tests.
- Improved cell performance and reliability through reduction of area specific resistance and interconnect reliability improvement to aid the Solid State Energy Conversion Alliance Industry Teams in achieving technical requirements and cost goals.
- Developed industry standards for the design and operation of a commercial-scale advanced hydrogen separation system and completed screening tests of a pre-engineering scale prototype unit to validate design parameters.

### — Electricity Delivery and Energy Reliability

The Department leads national efforts to modernize the electric grid, enhance security and reliability of the energy infrastructure, and facilitate recovery from disruptions to the energy supply through its Office of Electricity Delivery and Energy Reliability. The Department performs critical functions, by working with industry, state and local governments, national laboratories and other entities to: (1) develop advanced technologies to improve the reliability of energy delivery (2) guard against energy emergencies and (3) improve energy reliability and efficiency.

### — How We Serve the Public

The Department's electricity delivery and energy reliability activities benefit the public in several areas. In the field of R&D, work is conducted with national labs, private industry, and university and research institutions to develop technologies that will facilitate the

modernization of the Nation's electricity delivery system. The Department also analyzes the condition and operation of the energy infrastructure to identify critical transmission bottlenecks, chokepoints, market failures and other issues that are barriers to modernizing and upgrading the national electric grid. Finally, the Department responds to energy emergencies, helps protect against terrorist attacks on the energy infrastructure and assists all levels of government and the private sector recover from energy supply disruptions. In 2005/2006 the Department responded to meet the following public needs:

- Responding to Hurricanes Katrina and Rita: The Department staff accelerated vital infrastructure repairs, facilitated restoration of essential services, enabled resumption of port operations, and coordinated fuel delivery and ensured fuel distribution. While the Department's recovery role was widely applauded, several steps to improve upon response capabilities for FY 2006 and future years have been implemented.
- Securing the Electric Grid: The Department focuses on developing advanced technologies to secure vulnerable cyber assets in the energy sector. Power system reliability depends on extensive use of Supervisory Control and Data Acquisition (SCADA) networks and distributed control systems. Control systems are used throughout the U.S. energy sector to monitor and manage electricity flows in transmission and distribution lines, and oil and gas flows in pipelines. SCADA networks combine computers, applications and sensors that perform the key functions that keep the power flowing for the essential appliances we rely on for refrigeration, lighting, heating, cooling, and communication. While all energy sectors have stepped up protective measures, perhaps no area is more vulnerable to malicious cyber and physical attack than these interconnected systems. To develop better control system technology for the future, the Department partnered with industry to create a Roadmap to Secure Control Systems in the Energy Sector in January 2006. The roadmap identified critical challenges and priorities with input from leading industry experts. This document lays out a groundbreaking strategy and vision to develop control systems that can survive an intentional cyber attack without loss of critical functions.

Research and development efforts in the area of control systems security have resulted in:

- Development of cyber assessments and recommendations for reducing vulnerabilities of three SCADA/Energy Management Systems systems manufactured by major oil and gas sector producers;
- Partnerships with energy sector end-users to test and assess control systems cyber vulnerability using a Discovery Tool developed by the U.S. Department of Homeland Security; and
- Training for over 300 end-users on how cyber attacks are generated and how attacks can be diminished.



**Integrated Energy System:** An Integrated Energy system installed at the Fort Bragg 82nd Airborne Central Heating Plant.

### — Performance Against Key Targets

During FY 2006, the Department:

- Worked jointly with major electric utility companies in Albany and Long Island, New York and Columbus, Ohio to pilot a new high-temperature superconductive power line on the electric grid, in an effort to modernize electricity transmission and distribution in highly congested areas with high-energy demands. After more than 1,240 hours of testing the new lines, the results show a 50 percent reduction in loss of service lines which result in the ability to generate more reliable and efficient electric current to support more customers.
- Worked to prevent another blackout, similar to that in August 2003 which affected over 50 million customers. The Department and its partners are implementing the Eastern Interconnection Phasor Project. This project consists of developing and deploying a robust, widely-available, real-time monitoring and visualization system in the eastern portion of the North American power grid. This next generation system features Global Positioning System technology, secure data communications, custom visualization, and advanced controls. The data from the "phasor" measurement instruments are being fed into data archiving and analysis locations to make the project's information readily available to the utilities. The visualization and control systems will allow operators to detect



**Combined Heat and Power:** The new system provides the Dell's Children Hospital: 100 percent of the thermal requirements to operate the hospital's power supply; and cleaner, more reliable power that has a power backup to the electric grid.

disturbances and take action before problems cascade into widespread outages. During FY 2006, DOE spearheaded efforts that led to the installation and operation of 30 additional measurement units and two additional archiving and analysis locations for a cumulative total of 80 measuring units and eight archiving and analysis locations.

- Collaborated with the California Energy Commission and New York State Energy Research and Development Authority, to commission three pioneering energy storage projects. These projects will allow for the storage of electrical energy that will be available when needed. This will reduce transmission system congestion, help manage high energy demands, and make renewable electricity sources readily available and reliable.
- Developed a Combined Heat and Power system that operates at 70 plus percent efficiency rate that has benefited the Dell Children's Hospital energy operating needs. The Dell Children's Hospital has benefited from lessons learned at Fort Bragg U.S. military base and other Combined Heat and Power system users. The new system provides the Dell's Children Hospital with 100 percent of their energy requirements to operate the hospital's power supply and cleaner, more reliable power that has a power backup to the electric grid. During a natural or man-made disaster the new system will keep the hospital operational and available to serve the public.

### — Power Marketing Administrations

The Reclamation Project Act of 1939, the Flood Control Act of 1944, and other acts direct the Department's Southeastern, Southwestern, and Western Area Power Administrations to market and deliver the power produced at Federal dams to not-for-profit utilities at the lowest possible rates to consumers, consistent with sound business practices. The self-financed Bonneville Power Administration, operating under the Bonneville Project of 1937, the Transmission System Act of 1974, the Northwest Power Act of 1980 and other statutes, markets and delivers federal and non-federal power to meet its statutory and contractual obligations to its customers, including providing the net firm power requirements of its requesting customer utilities.

**Bonneville Power Administration:** Headquartered in Oregon, Bonneville is self-financed and markets wholesale electricity and transmission in Washington, Oregon, Idaho, and Western Montana, providing about half the electricity used in the Northwest and operating over three-fourths of the region's high-voltage transmission lines. For more information go to [www.bpa.gov/corporate](http://www.bpa.gov/corporate).

**Southeastern Power Administration:** Headquartered in Elberton, Georgia, Southeastern markets electricity generated at reservoirs operated by the U.S. Army Corps of Engineers. The marketing area includes southern Illinois, Kentucky, Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Tennessee and the panhandle of Florida. For more information go to [www.sepa.doe.gov](http://www.sepa.doe.gov).

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**Dispatcher:** This power system dispatcher monitors Supervisory Control and Data Acquisition system data to ensure enough generation is flowing to meet consumers' instantaneous demand for electricity. In control rooms operated by DOE's four power marketing administrations, dispatchers work around the clock to deliver 117.2 billion kilowatt hours of electricity to consumers across 3/4 of the continental United States.

**Southwestern Power Administration:** Headquartered in Oklahoma, Southwestern markets the hydroelectric power produced at 24 U.S. Army Corps of Engineers multi-purpose dams to customers in Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas. For more information go to [www.swpa.gov](http://www.swpa.gov).

**Western Area Power Administration:** Headquartered in Colorado, Western markets and delivers hydroelectric power and related services from 56 hydropower plants operated by the Bureau of Reclamation, U.S. Army Corps of Engineers, and the International Boundary and Water Commission, (over a 1.3 million square mile marketing area) to public power customers, including municipal and cooperative utilities and Native American tribes, in Arizona, California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Texas, Utah and Wyoming. For more information go to [www.wapa.gov](http://www.wapa.gov).

### — *How We Serve the Public*

The Power Marketing Administrations (PMA) market and deliver reliable, cost-based Federal hydroelectric power and related services to customers over much of the southeastern, central, and western United States. Transmission systems owned by the PMAs are part of the Nation's interconnected generation and transmission system and make a significant contribution to the country's past and future energy supply. While they assure that customers receive the benefits of Federal power, the PMAs also collect sufficient revenue to repay, within timeframes established by law and regulations, the American taxpayers' investment in such power generation and transmission systems. Each PMA implements individual power marketing programs



**Iceman:** This line worker chips ice off an insulator string on a 500-kV transmission line in frigid conditions to ensure the line stays in service delivering bulk electricity to 1,500 wholesale power customers across the high-voltage transmission lines operated by DOE's four power marketing administrations.



**Breakerbox:** Electricians wire circuit breaker controls. Circuit breakers are used to control the flow of electricity at 552 substations on the high-voltage power grids operated by DOE's four power marketing administrations.

based on regional hydropower sources and other factors inherent to their specific region of the country. By marketing and delivering Federal hydropower, the PMAs foster a diverse supply of reliable, affordable, and environmentally-sound energy while increasing the Nation's mix of energy options.

### — *Performance Against Key Targets*

During FY 2006, the Power Marketing Administrations:

- Achieved each of their targets for system reliability, respectively, in accordance with key Control Performance Standards developed by the North American Electric Reliability Council (NERC). In addition to



**Connecting:** A lineman connects conductor wire to an insulator string on the first phase of a new section of high-voltage transmission line. DOE's four power marketing administrations own and operate almost 34,000 miles of transmission lines stretching across 3/4 of the continental United States.

meeting their goal, the Power Marketing Administrations continue to exceed the electrical utility industry average. By reaching this goal, the Power Marketing Administrations are able to deliver affordable and reliable power across the United States.

- Completed repayment of the Federal power investment to the U.S. Treasury meeting their obligation to the U.S. Treasury and the public taxpayer.
- Due to the southeast area of the United States experiencing one of the worst drought periods in the past 100 years, the Southeastern Power Administration (SEPA) was only able to repay \$21 million (52 percent) of the planned \$40.7 million. For FY 2006, SEPA set a target of paying \$40.7 million annually under average water conditions to meet required payments as they come due and assure that all aged investments will be replaced on a timely basis now and in the future. Cyclical drought conditions resulted in below average power generation and a subsequent decrease in repayment. Greater than average rainfall over the previous 2 fiscal years enabled Southeastern's repayment to be significantly greater than planned. The cyclical nature of rainfall should be considered when evaluating off-year results that are less than expected.
- The severe drought in the southwest prevented the Southwestern Power Administration (SWPA) in providing \$462 million in economic benefits to the region from the sale of hydroelectric power (under average water conditions). Southwestern has achieved 69.7 percent, or \$322 million, of the \$462 million annual goal. Southwestern continues to experience severe drought conditions that hamper its ability to generate sufficient energy to fulfill its contractual obligations and provide expected economic benefits. In order to accomplish this goal, the system will have to generate approximately 720 gigawatt (GWh), or about 73 percent of average for the first quarter of FY 2007.

## — Energy Information Administration

The Department's Energy Information Administration (EIA) provides information on energy resources, reserves, production, demand, related financial information and energy technologies. EIA conducts survey and data collection operations, produces energy analyses and forecasts, and publishes data and analysis reports. EIA's customer base includes the Administration, Congress, Federal and State policymakers and agencies, the private sector, and International agencies.

### — How We Serve the Public

EIA's contributions are critical for promoting sound energy decision-making and efficient energy market operations, as well as fostering general public understanding. These contributions subsequently drive the supply and delivery of reliable, affordable and environmentally sound energy, both now and in the future. There has been an increasing reliance on EIA's data and analyses by the Administration, the Congress, industry, and the public to understand and respond to current and emerging changes in various energy sectors. These changes result from actions such as energy industry restructurings, demographic changes, new fuel standards, and legislative initiatives. For example, in the wake of high oil and natural gas prices, exacerbated by Hurricanes Katrina and Rita, during FY 2006 EIA testified 15 times before Congressional Committees, and has conducted more than 30 briefings for members of Congress and/or their staffs. In addition, EIA has responded to dozens of short-turnaround requests from the White House, other Federal departments, and Congressional staff for energy data and analysis. EIA's information is frequently referenced by news organizations both large and small, and the EIA website averaged over 1.5 million user sessions per month in FY 2006.

### — Performance Against Key Targets

During FY 2006, the Department's EIA:

- Achieved a "satisfied" or "very satisfied" rating from 90 percent of customers surveyed about the quality of EIA information, meeting the annual customer satisfaction target. EIA maintains this effectiveness through regular monitoring of customer satisfaction, something it has been doing for the past ten years.

## — SCIENCE —

## — ADVANCING SCIENTIFIC UNDERSTANDING —

TO PROTECT OUR NATIONAL AND ECONOMIC SECURITY BY PROVIDING WORLD-CLASS SCIENTIFIC RESEARCH CAPACITY AND ADVANCING SCIENTIFIC KNOWLEDGE.

*“To keep America competitive, one commitment is necessary above all: We must continue to lead the world in human talent and creativity. Our greatest advantage in the world has always been our educated, hardworking, ambitious people—and we are going to keep that edge. Tonight I announce an American Competitiveness Initiative, to encourage innovation throughout our economy, and to give our nation’s children a firm grounding in math and science.*

*First, I propose to double the Federal commitment to the most critical basic research programs in the physical sciences over the next 10 years. This funding will support the work of America’s most creative minds as they explore promising areas such as nanotechnology, supercomputing and alternative energy sources.”*

– President George W. Bush, State of the Union Message, January 31, 2006

At the heart of the American Competitiveness Initiative (ACI) is the idea that our Nation’s prosperity is based on innovation and risk taking. The United States has enjoyed unprecedented success because of our ability to innovate and create market opportunities where none existed before. The Nation’s ability to innovate is based on the willingness of its people to invest in world-class basic research and development facilities as well as build a system of education that ensures access and opportunity. However, both our system of education and research facilities are not short-term investment opportunities, rather, by nature, they represent the long-term risk that a great nation takes to ensure that people and technologies are in place to solve tomorrow’s challenges.

The American Competitiveness Initiative identifies three key Federal entities; the Department of Energy’s Office of Science (SC), the National Science Foundation, and the Department of Commerce’s National Institute for Standards and Technology that support basic research programs in the physical sciences and engineering. There are six major research goals identified in the American Competitiveness Initiative related to the Department:

- World-class capability and capacity in nanofabrication and nanomanufacturing that will help transform current laboratory science into a broad range of new industrial applications for virtually every sector of commerce;
- Chemical, biological, optical, and electronic materials breakthroughs critical to cutting edge research in nanotechnology, biotechnology, alternative energy, and the hydrogen economy through essential infrastructure;
- World-leading high-end computing capability (at the petascale) and capacity, coupled with advanced networking, to enable scientific advancement through modeling and simulation at unprecedented scale and complexity across a broad range of scientific disciplines and important to areas such as intelligent manufacturing, accurate weather and climate prediction;
- Overcoming technological barriers to revolutionizing fields of secure communications, as well as quantum mechanics simulations used in physics, chemistry, biology, and materials science;
- Overcoming technological barriers to efficient and economic use of hydrogen, nuclear, and solar energy through new basic research approaches in materials science; and
- Improving capacity, maintenance, and operations of DOE labs.

## — SCIENCE PERFORMANCE SCORECARD — (\$ in millions)

General Goal and Score	Program Costs		Programs and Scores		FY 2006 Budgetary Expenditures Incurred *					Performance of Annual Targets	
	FY 2006	FY 2005				Met (100%)	Met (80% - 99%)	Met (< 80%)	Undetermined		
5. World-Class Scientific Research Capacity	\$3,731	\$3,565	High Energy Physics	Y	\$ 4	0	1	0			
			Nuclear Physics	G	\$ 3	0	0	0			
			Biological and Environmental Research	G	\$ 7	0	0	0			
			Basic Energy Sciences	G	\$ 5	0	0	0			
			Advanced Scientific Computing Research	G	\$ 2	0	0	0			
			Fusion Energy Sciences	G	\$ 4	0	0	0			
Total Cost	\$3,731	\$3,565			\$ 25	0	1	0			

\* Includes capital expenditures but excludes such items as depreciation, changes in unfunded liability estimates and certain other non-fund costs, and allocations of Departmental administration activities.

## General Goal 5: World-Class Scientific Research Capacity

*Provide world-class scientific research capacity needed to ensure the success of Department missions in national and energy security; to advance the frontiers of knowledge in physical sciences and areas of biological, medical, environmental, and computational sciences; or to provide world-class research facilities for the Nation's science enterprise.*

The Department manages and provides the principal Federal funding for the Nation's research programs in high-energy physics, nuclear physics, fusion energy sciences, basic energy sciences, biological and environmental sciences, and computational science. It manages 10 world-class laboratories as part of the overall Department's laboratory portfolio. In FY 2006, these laboratories were used by more than 19,000 researchers from universities, other government agencies, private industry and the international science community. Through these investments, the Department is building the human and technological foundations necessary to retain the Nation's lead in world-class research and development.

### — Advanced Scientific Computing Research

#### — How We Serve the Public

*"Advanced computing is a critical element of President Bush's American Competitiveness Initiative and these projects represent an important path to scientific discovery...We anticipate that they will develop and improve software for simulating scientific problems and help reduce the time-to-market for new technologies."*

— Dr. Raymond Orbach, DOE Under Secretary for Science

"DOE Announces \$60 Million in Projects to Accelerate Scientific Discovery through Advanced Computing" [www.doe.gov/news/4135.htm](http://www.doe.gov/news/4135.htm) September 7th, 2006

Computational science is increasingly important to almost every scientific discipline that keeps America competitive. The Department's Advanced Scientific Computing Research (ASCR) program is expanding our world-class scientific research capability through advances in mathematics, high performance computing and advanced networks, and through the development and use of computers capable of many trillions of operations per second. Computer-based simulation allows us to understand and predict the behavior of complex systems that are beyond the reach of our most powerful experimental probes or our most sophisticated theories. For example, computer modeling and simulation enables us to understand how the chemical elements were created within the interior of stars and how protein machines work inside living cells that is critical to harnessing microbes for energy or waste cleanup needs. ASCR supports scientific computing research activities occur at more than 70 academic institutions and 15 DOE laboratories. In addition, more than 2,400 university scientists, government agencies, and U.S. companies use ASCR-funded high-performance computers each year.

## — Performance Against Key Targets

### Scientific Discovery through Advanced Computing (SciDAC) Support

During FY 2006, the Department:

- Exceeded its goal of improving by 50 percent its average annual percentage increase in the computational effectiveness (either simulating the same problem in less time or simulating a larger problem in the same time) of a subset of application codes within the Scientific Discovery through Advanced Computing (SciDAC) effort by achieving an increase of 71 percent. The SciDAC program is a collection of partnerships between ASCR program and the other Department programs aimed at strengthening the role of high-performance computing in furthering science and advancing the Department's missions. The SciDAC program has contributed to a number of areas including: climate modeling and prediction, plasma physics, particle physics, accelerator design, astrophysics, chemically reacting flows, and computational nanoscience.



**Supercomputer Autograph:** President George W. Bush signing the Cray X1 supercomputer installed in the Computational Sciences Building at Oak Ridge National Laboratory

### — Biological and Environmental Research

#### — How We Serve the Public

The Department's Biological and Environmental Research (BER) program supports basic research that impacts our health, environment, and energy future and is a key element of the ACI. Biotechnology solutions to our Nation's energy and environmental challenges are only possible by understanding complex biological systems and developing computational models that predict their behavior. The BER program is developing the understanding needed to advance biotechnology-based strategies for bio-fuel production, focusing on the President's Advanced Energy Initiative (AEI) related goals in biohydrogen and bioethanol development. Additionally, BER is advancing our ability to predict long range and regional climates for effective future planning of our energy, agriculture, land and water needs.

## — Performance Against Key Targets

During FY 2006, the Department:

### DNA Sequencing

- Increased the rate of DNA sequencing beyond its FY 2006 target of 30 billion base pairs by sequencing more than 32.7 billion base pairs. To unlock the code of an organism's genetics, the BER program is working to sequence the related genome. Thanks to investments in technological improvements, the rate at which the BER program can extract this sequence has been steadily increasing. The Department is working toward developing microbes that might generate hydrogen, sequester carbon dioxide, and breakdown chemical or radioactive waste.

### Climate Change

- Met its goal of producing a new continuous time series of retrieved cloud properties at each Atmospheric Radiation Measurement site and evaluating the extent of agreement between climate model simulations of water vapor concentration and cloud properties and measurements of these quantities on time scales of 1 to 4 days. The Department's climate

change research is focused on developing accurate advanced climate models that can predict climate changes decades to centuries in the future. These models require that we explore the role of the oceans, atmosphere, sea ice, and land masses on climate; as well as the role of clouds in controlling solar and terrestrial radiation. It also studies the impacts of increasing carbon dioxide in the atmosphere on the Earth's climate and ecosystems to develop possible mitigation strategies from human sources, including energy use. BER's research enables policymakers to develop science-based energy policy for the U.S.

### Biomedical Engineering

- Met its goal of completing the design of a 256 microelectrode array retinal prosthesis, and constructing and testing individual components for electronic integrity and biocompatibility in vitro and in animal test systems. BER researchers are developing medical diagnostic and therapeutic technologies to treat and diagnose disease, conduct non-invasive medical imaging, and advance biomedical engineering.

## — Basic Energy Sciences

### — How We Serve the Public

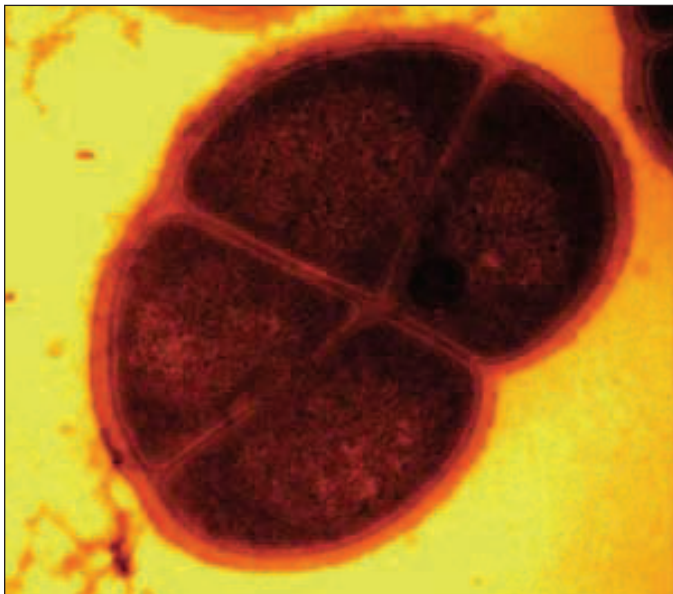
Basic research supported by the Department's Basic Energy Sciences (BES) program touches virtually every aspect of the Department's mission that will lead to transformational energy technologies for our Nation. BES research in materials sciences and engineering is leading to the development of materials that improve the efficiency, economy, environmental acceptability, and safety of energy generation, conversion, transmission, and use. The BES program supports materials research critical to hydrogen fuel, biofuels, and numerous other major industrial applications. Basic chemical research is leading to the development of advances such as efficient combustion systems with reduced emissions of pollutants; new solar photo-conversion processes; improved catalysts for the production of fuels and chemicals; and better separations and analytical methods for applications in energy processes, environmental remediation, and waste management. Research in the molecular and biochemical nature of photosynthesis is aiding the development of solar photo energy conversion and biomass conversion.

## — Performance Against Key Targets

### World Class Scientific Facilities

During FY 2006, the Department:

- Met its goal of operating its BES scientific user facilities in excess of 90 percent of the scheduled available operating hours. BES provides the Nation's researchers with world-class research facilities, including reactor- and accelerator-based neutron sources, light sources soon to include the X-ray free electron laser, nanoscale science research centers, and electron beam micro-characterization centers. These facilities provide the world's best capabilities for imaging and characterizing materials of all kinds from metals, alloys, and ceramics to fragile biological samples.



### Imagine something that loves to eat nuclear waste:

Nuclear waste is a gourmet meal for one type of bacteria, *Deinococcus radiodurans*. In the 1950's, scientists discovered this bacterium in a can of spoiled ground beef that had been "sterilized" with radiation. Further study showed that the remarkable DNA repair processes of *D. radiodurans* permit the microbe to survive amazingly large amounts of radiation, amounts that would kill most organisms, including humans. In 1999, researchers completed the DNA sequencing for this bacterium, and now scientists are exploring genetic manipulation that would expand *D. radiodurans*' extraordinary capabilities for removing toxic wastes from contaminated sites.



### The Advanced Photon Source (APS) at the Argonne National Laboratory

is a national synchrotron-radiation light source research facility. Utilizing high-brilliance x-ray beams from the APS, scientist carry out world-class basic and applied research in the fields of materials science; biological science; physics; chemistry; environmental, geophysical, and planetary science; and innovative x-ray instrumentation. The knowledge gained from this research is impacting the evolution of combustion engines and microcircuits, aiding in the development of new pharmaceuticals, and pioneering nanotechnologies whose scale is measured in billionths of a meter.

Understanding materials and biology at the molecular and atomic level is essential for developing the materials, devices and medical treatments and drugs of the future. For example, researchers at the Advanced Photon Source (APS) have determined the structure of a key protein believed to play a role in a deadly infection that afflicts the lungs of patients with cystic fibrosis.

The Spallation Neutron Source was completed this year and is the world's most powerful neutron scattering facility for studying the structure and dynamics of materials using neutrons. This user facility enables researchers from the United States and abroad to study the science of materials that forms the basis for new technologies in telecommunications, manufacturing, transportation, information technology, biotechnology and health.

### Nanoscale Research

During FY 2006, the Department:

- In FY 2006, the Department met its goals of demonstrating an X-ray pulse of less than 100 femtoseconds in duration and containing more than 100 million photons per pulse demonstrating the first measurement of spatial resolutions for imaging in the hard and soft x-ray regions, and spatial information limit for an electron microscope (nanometers). For FY06, the spatial resolution targets were 100, 18, and 0.08 nanometers, respectively.

*Because the sciences—and especially their applications—are interconnected, research in physical science and engineering provides tools and technologies for all other fields. Ultimately, of course, everything is made of atoms and their sub-components. As such, basic techniques for the imaging, manipulation and simulation of matter at the atomic scale are of value for applications in all fields.*

— American Competitiveness Initiative, February 2006

Just as the resolution of a computer screen determines the clarity of very small images, the resolution of scientific equipment determines the clarity with which scientists can “see” very small objects such as viruses or even atoms. In addition to seeing at the nanoscale, it is important to understand how molecular processes unfold over time. Similar to a camera's shutter speed controlling the sharpness of the photograph of a fast moving object, temporal resolution determines how well scientists can “see” fast events, such as chemical reactions and the folding of proteins, which happen in femtoseconds (1/1,000,000,000,000 of a second). The current challenge is to create instruments that can simultaneously measure the very small and the very fast. With these tools, we will better understand how the nanoscale composition of materials determine their physical properties, how protein structures reshape themselves, how chemical reactions take place, and the nature of the chemical bond. The ability to see small objects and observe rapid processes are crucial to building world-class nanoscale fabrication and manufacturing capabilities described in the ACI.

### — Fusion Energy Sciences

### — How We Serve the Public

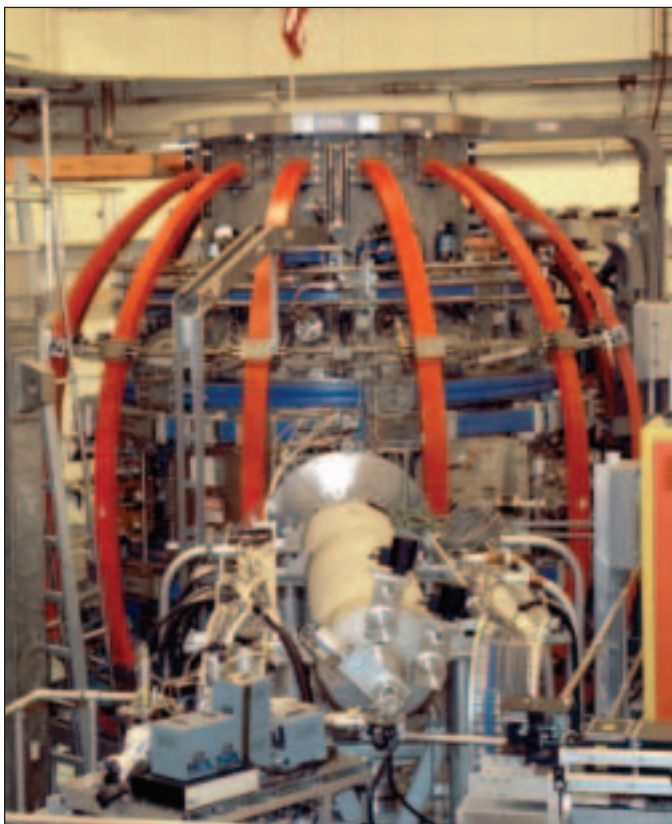
The Department's Fusion Energy Sciences (FES) program advances the theoretical and experimental understanding of plasma and fusion science, including a close collaboration with international partners in identifying and exploring plasma and fusion physics issues through specialized facilities. In our sun, the gravitational forces at its center compress hydrogen into a very dense super-heated plasma sufficient to cause the hydrogen nuclei to fuse into helium nuclei. The advantage of using fusion energy here on Earth is that a small amount of hydrogen converted to helium would release a large amount of energy. When perfected, fusion will provide a virtually never-ending, safe and environmentally friendly energy source available to the whole world. The challenge is to understand and recreate this hot dense plasma here on Earth. FES leads the U.S. participation in the joint international research and development fusion project, known as ITER (in Latin, iter means “the way”). This international collaboration will provide an unparalleled scientific research opportunity with a goal of demonstrating the scientific and technical feasibility of fusion power.

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In FY 2005 and early FY 2006, international negotiations on ITER resulted in the host site selection of Cadarache, France, and India joining ITER as a full non-host party. In May 2006, the seven ITER parties initialed the ITER Agreement in Brussels, to signify that the text was final. The signing of the Agreement will confirm the multilateral commitment for ITER and provide the legal framework for the construction, operation, deactivation, and decommissioning phases.

*"Initiating this agreement brings us one step closer to a viable source of fusion power, with the potential to free the quickly growing global economy and population from the looming constraints of conventional energy supplies and their associated environmental effects...It is for reasons of international peace, prosperity, and environmental security that President Bush led the United States to participate in the ITER project. This is the first stand alone, truly international, large-scale scientific research effort in the history of the world. It is quite striking that the seven parties to the agreement represent more than half of the world's population."*

— Dr. Raymond Orbach, Under Secretary of Science, May 24, 2006



**National Spherical Torus Experiment (NSTX)** is an innovative magnetic fusion device that was constructed at the Princeton Plasma Physics Laboratory in collaboration with the Oak Ridge National Laboratory, Columbia University and the University of Washington.

## — Performance Against Key Targets

### U.S. Experimental Facilities Supporting ITER

During FY 2006, the Department:

- Supported the ITER effort and fusion research by meeting its goal of an average operation time of greater than 90 percent of the major national fusion facilities (the DIII-D tokamak, the Alcator C-Mod, and the National Spherical Torus Experiment (NSTX)) as a percentage of the total planned operation time. The U.S. Burning Plasma Organization, established in May 2006, coordinates burning plasma research in the U.S. and made major progress by developing its structure, membership, and working on specific tasks for U.S. support for ITER physics and technology.

## — High Energy Physics

### — How We Serve the Public

The Department's High Energy Physics (HEP) program provides over 90 percent of the Federal support for the Nation's high energy physics research. This research advances our understanding of how the universe works at its most basic level, from the elementary constituents of matter to the recently discovered but still mysterious dark energy and dark matter that dominates our universe.

*"High energy physics labors at what is arguably the deepest frontier of science, and this fact is significant to its long term appeal to great nations."*

— John Marburger

John Marburger, Director, Office of Science and Technology Policy Executive Office of the President, Washington, D.C. March 3, 2006

The Department's HEP program represents our Nation's continued search for new knowledge about the origins of our universe. While it is uncertain whether the knowledge gained from this research will develop into a new product or energy source, the technology that has so far been developed to support the demands of high energy and nuclear physics research has become indispensable to other fields of science and has found wide applications in both industry and medicine. One-third of all accelerators today are used in medical applications including cancer therapy, imaging, and the production of short-lived isotopes. The other nearly two-thirds are used for industrial applications ranging from micro-machining to food sterilization and for national security applications, which include x-ray inspection of cargo containers and nuclear stockpile stewardship.

## — Performance Against Key Targets

### World Class Scientific Facilities

The Department's HEP researchers are world leaders in the construction and development of advanced particle accelerators and detector technologies. The HEP program provides these research facilities to

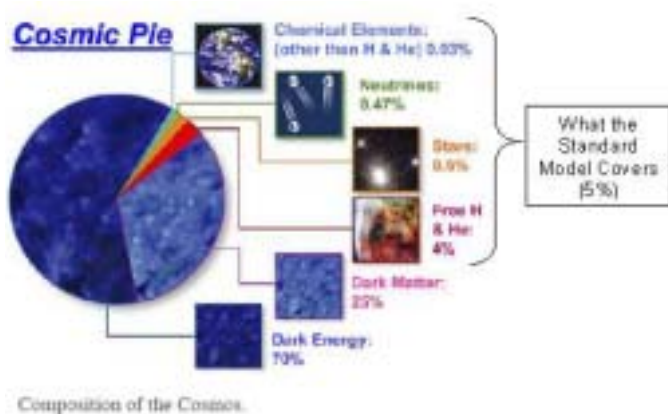
research teams from around the world, not only in high energy physics, but increasingly in other fields, including particle astrophysics and cosmology.

During FY 2006, the Department:

- Failed to meet its goal of achieving a greater than 80 percent average operation time of the scientific user facilities (the Fermilab Tevatron and the Stanford Linear Accelerator (SLAC) B-factory) as a percentage of the total scheduled annual operating time. This was caused by extended downtime at the Tevatron. The HEP program was still able to support approximately 3,200 researchers in FY 2006 and the Tevatron is now fully operational.

### The Standard Model and the Higgs Boson

The Standard Model of particle physics is currently the most widely accepted theory for matter and the forces that act on them. This theory, which has existed for about 30 years, is the foundation from which physicists work to advance our understanding of the universe, but it is incomplete since it only addresses approximately 5 percent of the known universe. A new theoretical vision is required that embraces the Standard Model while resolving the mystery of newly discovered dark energy and dark matter. Experiments conducted at our particle accelerators seek evidence of “unification,” the melding of today’s diverse family of particles and interactions into a much simpler picture at high particle energies, similar to those that prevailed in the beginning of the universe.



During FY 2006, the Department:

- Facilitated Higgs Boson research by meeting its goal of delivering, within 20% of the baseline estimate, a total integrated amount of data (in inverse picobarns) to the Collider (CDF) and D-Zero detectors at the Tevatron. Because the detector’s probability of capturing collision event data is extremely low per collision, researchers require large amounts of data from a large number of collisions. Researchers hope this collision data will provide the evidence for the existence of the Higgs Boson, a theoretical particle that gives matter its mass characteristic.

### Matter-Antimatter Asymmetry Research Results

Today’s universe consists mostly of matter with very little antimatter, known as matter-antimatter asymmetry. However, the current Standard model predicts a universe balanced between with equal amounts of matter and antimatter. HEP researchers strive to understand how this inequality occurred and to understand why matter and antimatter did not completely annihilate each other in the early universe. Matter-antimatter asymmetry research is conducted primarily at the B-factory at the SLAC in California. This facility provides precision measurements of how matter and antimatter behave differently in the decays of short-lived exotic particles known as B-mesons, considered by physicists to be vital to solving this mystery.

During FY 2006, the Department:

- Met its goal of delivering within 20 percent of baseline estimate a total integrated amount of data (in inverse femtobarns) delivered to the BABAR detector at the SLAC B-factory. The FY 2006 baseline was 100 inverse femtobarns, so within 20 percent of baseline is 80 inverse femtobarns.

### — Nuclear Physics

#### — How We Serve the Public

The Department’s Nuclear Physics (NP) program is the major sponsor of fundamental nuclear physics research in the Nation, providing about 90 percent of Federal support. NP builds and operates leading scientific facilities and state-of-the-art instrumentation to study the evolution and structure of nuclear matter, from the smallest building blocks, quarks and gluons, to the natural elements. Key areas of research aim to expand our understanding of how the quarks and gluons interact to form protons and neutrons, and of the properties and behavior of the nucleus under extreme conditions of temperature and pressure. Results and insight from these studies are relevant to understanding the earliest moments of the universe, how the chemical elements were created, and how the properties of one of Nature’s basic constituents, the neutrino, influences astrophysics phenomena such as supernovae.

*Today’s revolutionary technologies and many of our most popular consumer products have roots deep in basic and applied research. Long before there were computers and the Internet, scientists were unlocking the secrets of lasers, semiconductors, and magnetic materials upon which today’s applications were built. This enterprise was fueled in large part by Federal investment in basic research that was necessary but not necessarily profitable for the private sector to undertake over the long term.*

— American Competitiveness Initiative, February 2006

## — Performance Against Key Targets

### World Class Scientific Facilities

The majority of NP's research is conducted at our national user facilities, such as the Argonne Tandem Linac Accelerator System (ATLAS) at Argonne National Laboratory, the Holifield Radioactive Ion Beam Facilities (HRIBF) at Oak Ridge National Laboratory, the Continuous Electron Beam Accelerator Facility (CEBAF) at Thomas Jefferson National Accelerator Facility, and the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory.

During FY 2006, the Department:

- Met its goal of achieving at least 80 percent average operation time of the scientific user facilities as a percentage of the total scheduled annual operating time.

### Quantum Chromodynamics

The CEBAF is the world's most powerful electron "microscope" for studying the nucleus and advancing our knowledge of the internal structure of protons and neutrons. Protons and neutrons are made up of even smaller particles called quarks and gluons. Researchers are studying a unique property of the quarks and gluons called "confinement." Confinement means that we can never observe an isolated quark or gluon, they are only observed bound to other quarks and gluons. By providing precision experimental information concerning the quarks and gluons, the approximately 1,200 experimental researchers that use CEBAF, together with researchers in nuclear theory, seek to describe nuclear matter in terms of the fundamental theory of strong interaction, known as quantum chromodynamics. In nuclear physics, the average number of events recorded by detectors is a good indicator of progress. The events that

researchers are really interested in are rare, so the more events they record the more likely they will record what they are interested in studying.

During FY 2006, the Department:

- Met its goal of recording at least 80 percent of the weighted average number of billions of events recorded by experiments in Hall A, Hall B, and Hall C at the CEBAF. The FY06 Baseline weighted average is 3.62 (1.45, 7.70, 1.70); so at least 80% of the weighted average is 2.89 (1.16, 6.16, 1.36).

### The Power of the Stars

The low energy ion beams generated by ATLAS allows NP scientists to study the stability and structure of atomic nuclei and explore the origin of the chemical elements and their role in shaping the reactions that occur in the cosmos. HRIBF produces beams of radioactive nuclei with a wide range of easily variable energies and intensities believed sufficient for scientists to make the first direct measurements of the nuclear reactions which power supernovae, X-ray bursts, and other stellar explosions.

During FY 2006, the Department:

- Met its goal of recording at least 80 percent of the weighted average number of billions of events recorded at the ATLAS and HRIBF facilities, respectively. The FY 2006 Baseline weighted average is 9.5 (17.5, 1.4); so at least 80 percent of the weighted average is 7.5 (14, 1.1).

### — External Factors Related to General Goal 5

Currently, no external factors appear to impact the ability to achieve this General Goal. However, the prospect of insufficient scientific and technical talent, now and in the foreseeable future, is a Departmental concern for maintaining a world-class scientific capacity.

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## — ENVIRONMENT —

## — ELIMINATING THE ENVIRONMENTAL LEGACY —

TO PROTECT THE ENVIRONMENT BY PROVIDING A RESPONSIBLE RESOLUTION TO THE ENVIRONMENTAL LEGACY OF THE COLD WAR AND BY PROVIDING FOR THE PERMANENT DISPOSAL OF THE NATION'S HIGH-LEVEL RADIOACTIVE WASTE.

Fifty years of nuclear defense work and energy research resulted in large volumes of solid and liquid radioactive waste along with significant areas of contaminated soil and water.

The mission of the Department's Environmental Management program is to safely clean up the contamination from these operations and dispose of the waste in a manner protective of the environment, the workers, and the public. Over the past several years, the program has delivered significant risk reduction and cleanup results while ensuring that the cleanup is safe for workers, protective of the environment and cost effective. These outcomes provide important and valuable benefits for future generations. The Office of Environmental Management (EM) made significant advances in FY 2006 in accelerating its schedule for the packaging and disposition of high-risk nuclear materials.

Following site closure, the Office of Legacy Management (LM) takes control of the site and has the mission of protecting human health and the environment through effective long-term stewardship of land, structures, facilities, and records. LM also oversees the Department's post-closure responsibilities for former contractor employees.

The Office of Civilian Radioactive Waste Management (RW) is responsible for constructing a geological repository at Yucca Mountain, Nevada, to manage and dispose of high-level radioactive waste and spent nuclear fuel in a manner that protects health, safety and the environment; enhances national and energy security; and merits public confidence. Disposition of these materials in a geologic repository is necessary to ensure the United States maintains an energy portfolio and remains competitive in the global economy, as well as to support cleanup of our defense sites, and to advance out international nonproliferation goals. RW made significant progress in FY 2006 toward developing a license application for a geological repository at Yucca Mountain, Nevada, by applying the necessary resources to enhance and improve the underlying scientific and engineering bases for proceeding with the development of the Yucca Mountain site.

### General Goal 6: Environmental Management

***Accelerate cleanup of nuclear weapons manufacturing and testing sites, completing cleanup of 108 contaminated sites by 2025.***

For all its missions, safety is the Department's number one priority, including Environmental Management. EM continues to maintain and demand the highest safety performance in all aspects of its work. The Department's cleanup program is focused on risk reduction, that is also cost effective, and working collaboratively with regulators and stakeholders in developing site closure strategies.

While EM focuses on achieving site closure, LM focuses on post-closure activities – long-term surveillance and maintenance, site records, pension plans, and post-retirement benefits. This separation of mission objectives ensures that both offices are fully committed to their respective objectives, thus heightening the Department's visibility and accountability to the affected communities.

#### — How We Serve The Public

The Department is facing the environmental legacy of more than 50 years of nuclear weapons production and nuclear power research and development. This mission requires the stabilization and disposition of large volumes of contaminated material and high-level radioactive waste. Once completed, environmental risks will be effectively eliminated. This program is the largest cleanup effort in the world – encompassing over 2 million acres at 114 sites. As of September 2006, the Department has completed cleanup and is monitoring 89 formerly contaminated geographical sites.

#### — Performance Against Key Targets

The Department set interim targets of cleaning up 89 and 100 geographic sites by the end of FY 2006 and FY 2012, respectively. To ensure the success of these future targets, EM maintains a set of corporate

#### — ENVIRONMENT PERFORMANCE SCORECARD — (\$ in millions)

General Goal and Scores	Program Costs		Programs and Scores		FY 2006 Budgetary Expenditures Incurred *					Performance of Annual Targets	
	FY 2006	FY 2005				Met (100%)	No Met (> 80%)	No Met (< 80%)	Undetermined		
6. Environmental Management	\$5,669	\$6,719	Environmental Management	G	\$ 5	0	1	0			
			Legacy Management	G	\$ 2	0	0	0			
7. Nuclear Waste	\$484	\$521	Nuclear Waste Disposal	G	\$ 3	0	0	0			
Total Cost	\$6,153	\$7,240			\$ 10	0	1	0			

\* Includes capital expenditures but excludes such items as depreciation, changes in unfunded liability estimates and certain other non-fund costs, and allocations of Departmental administration activities.



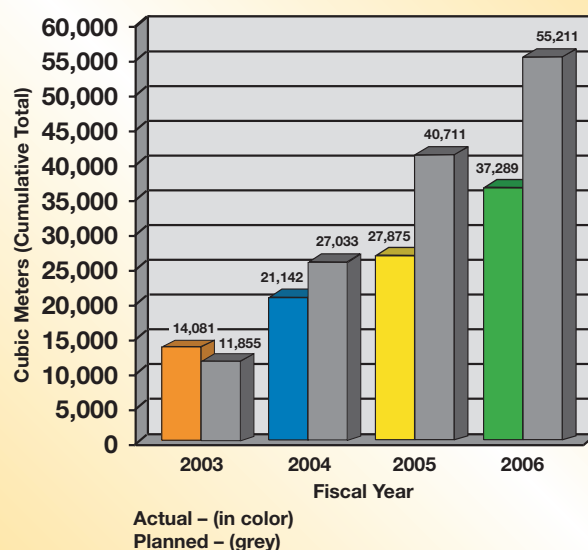
**Radioactive Facility Demolition:** The demolition of the decontaminated 334A Waste Acid Storage Building at the Hanford Reservation at Richland, Washington.

performance measures that enables the program to track the accomplishment of risk reducing actions at each of its sites. These corporate performance measures are quantitative and provide a comprehensive programmatic perspective to completing the EM mission. The performance measures, each of which has an established annual target, are tracked in the context of the total measure (life-cycle) necessary to complete cleanup at each site. The key performance measures below portray the broad scope of challenges the EM program faces in completing its cleanup mission.

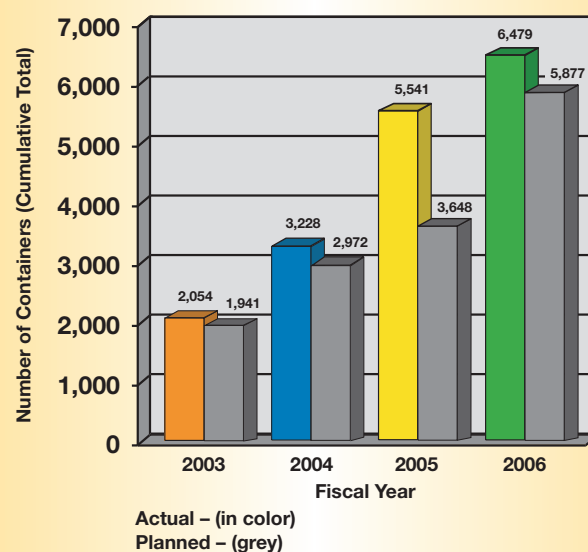
During FY 2006, the Department:

- Packaged for disposition a cumulative total of 6,479 enriched uranium containers. This is an increase of 938 containers over the cumulative total of 5,541 enriched uranium containers packaged in FY 2005 and exceeds the cumulative target of 5,877 for FY 2006 by 602 containers. The accelerated schedules at the Savannah River Site for disposition of enriched uranium were maintained throughout the year and resulted in this FY 2006 target being exceeded. This FY 2006 accomplishment will result in the Department succeeding in its environmental cleanup mission.
- Packaged for disposition a cumulative total of 2,489 containers of high level waste exceeding the cumulative FY 2006 target of 2,477 by 12. This is an increase of 252 containers over the planned cumulative total of 2,227 containers of high-level waste packaged for disposition in FY 2005. This accomplishment will enable the Department to remain on schedule for this environmental cleanup in future years.
- Completed the remediation work at a cumulative total of 365 nuclear and radioactive facilities, exceeding its FY 2006 cumulative target. This is an estimated increase of 66 facilities over the planned cumulative total of 299 nuclear and radioactive facility completions in FY 2005. Many sites, including facilities in Rocky Flats, are physically completed and awaiting final regulatory approval. When the regulators approve the

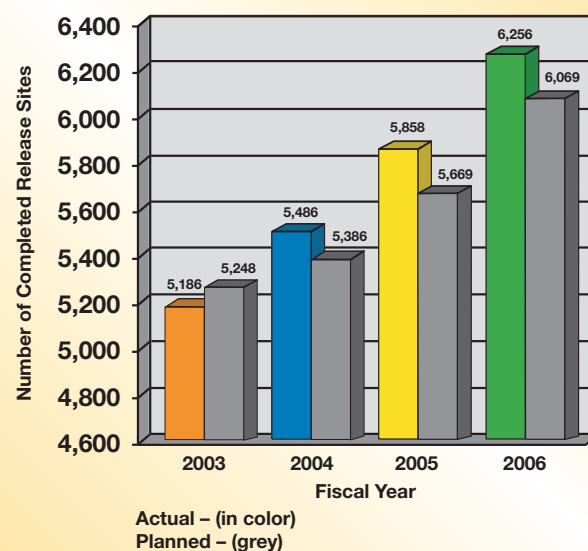
**Chart 1 – TRU Waste Disposed at WIPP**



**Chart 2 – Enriched Uranium Packaged for Disposition**



**Chart 3 – Completed Release Sites**



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facility completion reports, the Department will be able to count these facilities toward its target. Achieving this annual performance target will enable the Department to maintain its accelerated cleanup schedule.

- The Department failed to meet its target of disposal of transuranic (TRU) waste at the Waste Isolation Pilot Plant (WIPP) a cumulative total of 55,211 cubic meters of TRU waste. This was an estimated increase of 14,500 cubic meters over the planned cumulative total of 40,711 cubic meters of TRU waste to be disposed at WIPP in FY 2005. This shortfall was caused by delays throughout the complex including Idaho, Los Alamos National Laboratory (LANL), and the Savannah River Site that began in FY 2004. As Chart 1 indicates, EM was behind its life-cycle schedule for disposing of a cumulative total of 40,711 cubic meters of TRU waste at the end of FY 2005 and behind its schedule for disposing of 27,033 cubic meters of waste in FY 2004. While the Department has not met its goal for FY 2006, the program is still on-track to meet its life-cycle target for the EM cleanup mission. EM has taken action to revise and improve procedures and implement corrective actions at Idaho. The Advanced Mixed Waste Treatment Facility at Idaho processes waste at or near its design capacity. Idaho has also met its goal of 6,000 cubic meters TRU waste disposed at WIPP in FY 2005, required by the 1995 Settlement Agreement. The Department is also evaluating its schedule for shipments and will establish realistic targets for FY 2007.

LM supports the General Goal by ensuring that the Department's long-term agreements and legal commitments to environmental stewardship and to former contractor employees are satisfied. By managing the long-term surveillance and maintenance at closed sites where remediation has been essentially completed EM is allowed to concentrate its efforts on continuing to accelerate cleanup and site closure. This results in reduced risks to human health and the environment as well as reduced landlord costs.



**Uranium into Electricity:** After weapons-grade uranium is down blended and packaged, the material is shipped to a nuclear fuel manufacturer in Erwin, TN, where it is converted into fresh reactor fuel for use in a TVA reactor to produce electricity. Shown is a shipment of low-enriched uranium leaving the Savannah River Site for Erwin, TN.

During FY 2006, the Department:

- Exceeded its goal of conducting surveillance and maintenance activities at 69 sites to ensure the effectiveness of cleanup remedies in accordance with legal agreements, or identifying sites subject to additional remedial action in order to ensure effectiveness, by completing surveillance and maintenance activities at 70 sites (including Pinellas and Maxey Flats). Exceeding this measure ensures continued effectiveness of cleanup remedies, and thereby protection of human health and the environment.
- Exceeded its goal of reducing the ratio of program direction expenditures to the total expenditures (excluding Congressionally Directed Activities) by 1 percent from the FY 2005 baseline by reducing the ratio by 4 percent. Program direction expenditures in FY 2006 were \$12.9 million which is less than the 1 percent target expenditure of \$15.3 million. Accomplishment of this measure ensures lower administrative costs for the program activities. This will result in a reduced ratio of program direction expenditures which lessens administrative cost per program dollar.

### — External Factors Related to General Goal 6

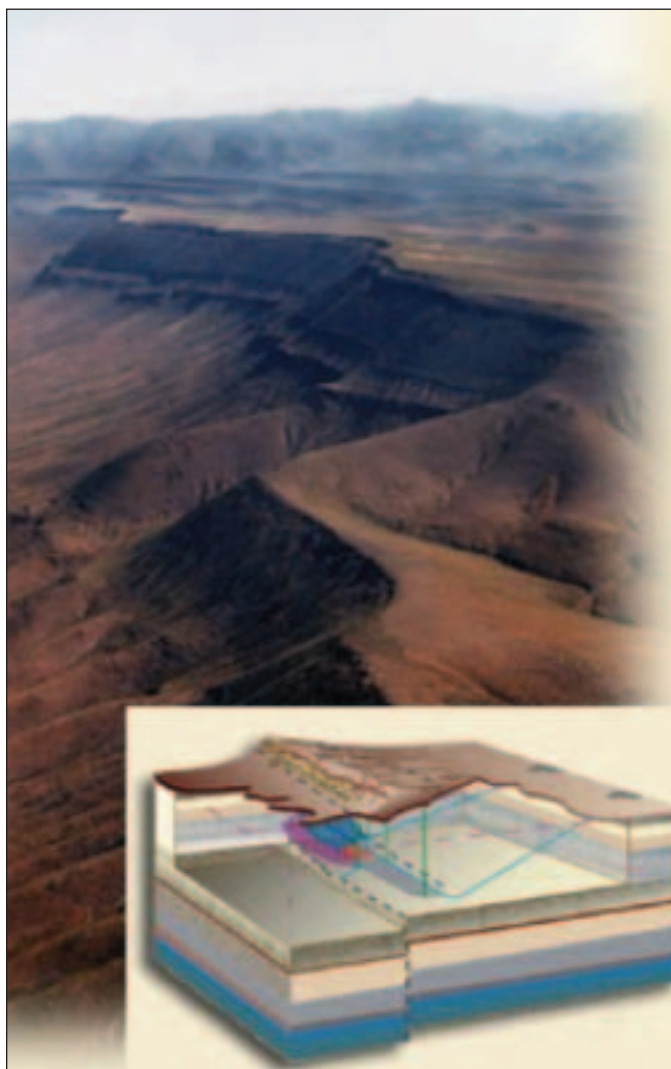
The following external factors could affect our ability to achieve this goal:

- **Regulatory Requirements:** The Department's approach to cleanup is influenced by various regulatory requirements, including compliance with environmental laws and regulations, agreements with state and federal regulators, and judicial decisions. Further, existing laws and regulations are often subject to change and agreements with States require renegotiation and judicial decisions can alter long-term plans.
- **Technology:** The development and deployment of innovative technologies could help reduce risk, lower cost, and accelerate the pace of cleanup. However, suitable cleanup technologies may not currently exist for all cleanup conditions.
- **Uncertain Work Scope:** Uncertainties are inherent in the environmental cleanup program due to the complexity and nature of the work. For example, there are uncertainties at some of the sites regarding the types of contaminants, the extent of the contamination concentration levels and end states for cleanup. As cleanup progresses, new discoveries of additional or more complex contamination is not uncommon. Also, the end state for cleanup at certain sites has not been fully determined.
- **Commercially Available Options for Waste Disposal:** Accelerated risk reduction and site closure is always dependent upon the continued availability of commercial mixed low-level waste and low-level waste disposal facilities.

## General Goal 7: Nuclear Waste

### *License and construct a permanent repository for nuclear waste at Yucca Mountain and begin acceptance of waste.*

The disposal of spent nuclear fuel from the Nation's commercial and defense nuclear reactors, and the disposal of high-level radioactive waste from environmental cleanup from the Cold War era, are the Federal Government's responsibilities as directed by the Nuclear Waste Policy Act of 1982, as amended. In July 2002, after more than two decades of scientific study, the Yucca Mountain Development Act was passed by a joint Congressional Resolution and signed by President Bush, designating Yucca Mountain as the site of the Nation's first geologic repository for high-level radioactive waste and spent nuclear fuel. With that designation, the RW program transitioned from scientific site characterization to license application preparation for a submittal to the Nuclear Regulatory Commission (NRC) now scheduled for June 2008.



**Yucca Mountain:** This artist's drawing shows what a repository might look like inside Yucca Mountain, if one were to be built there. Construction would take place through tunnels underground.

### — *How We Serve the Public*

The construction and operation of new commercial nuclear power plants allows the United States to maintain a diverse energy portfolio and improves our energy security by successfully opening and operating a repository at Yucca Mountain for the disposal of commercial spent nuclear fuel.

### — *Performance Against Key Targets*

During FY 2006, the Department:

- Revised the project conceptual design report to adopt a primarily canister-based approach for handling commercial spent nuclear fuel to enable more efficient repository surface facility construction and simplify repository operations.
- Received Energy Systems Acquisition Advisory Board approval of a revised critical decision-1 to proceed with the canister-based approach and prepare for critical-decision-2.
- Issued a revised Program schedule to submit a license application to the NRC by June 30, 2008, and begin initial operations by 2017.
- Published the draft rail alignment environmental impact statement in the Federal Register on August 3, 2006.
- Designated Sandia National Laboratory as the lead laboratory to coordinate and organize all scientific work on the Yucca Mountain Project. Sandia will develop the total system performance assessment in order to strengthen and enhance long-term performance assessment by reducing model uncertainties and conservatisms. The laboratory will also review the existing infiltration model and prepare a new model. This new model and the results will be used as part of the technical basis for the license application.
- Initiated operational planning activities in coordination with responsible Federal agencies while leveraging existing DOE expertise in materials shipment to identify the long-lead logistical planning, rolling stock and hardware acquisition strategies, and ancillary communication, traffic management and proactive technologies to enable the efficient, safe, and secure transport of radioactive materials by 2017.
- Improved and upgraded facilities to enhance worker safety and health.

### — *External Factors Related to General Goal 7*

The opening date of the Yucca Mountain repository will also depend on resolution of a number of external factors, including:

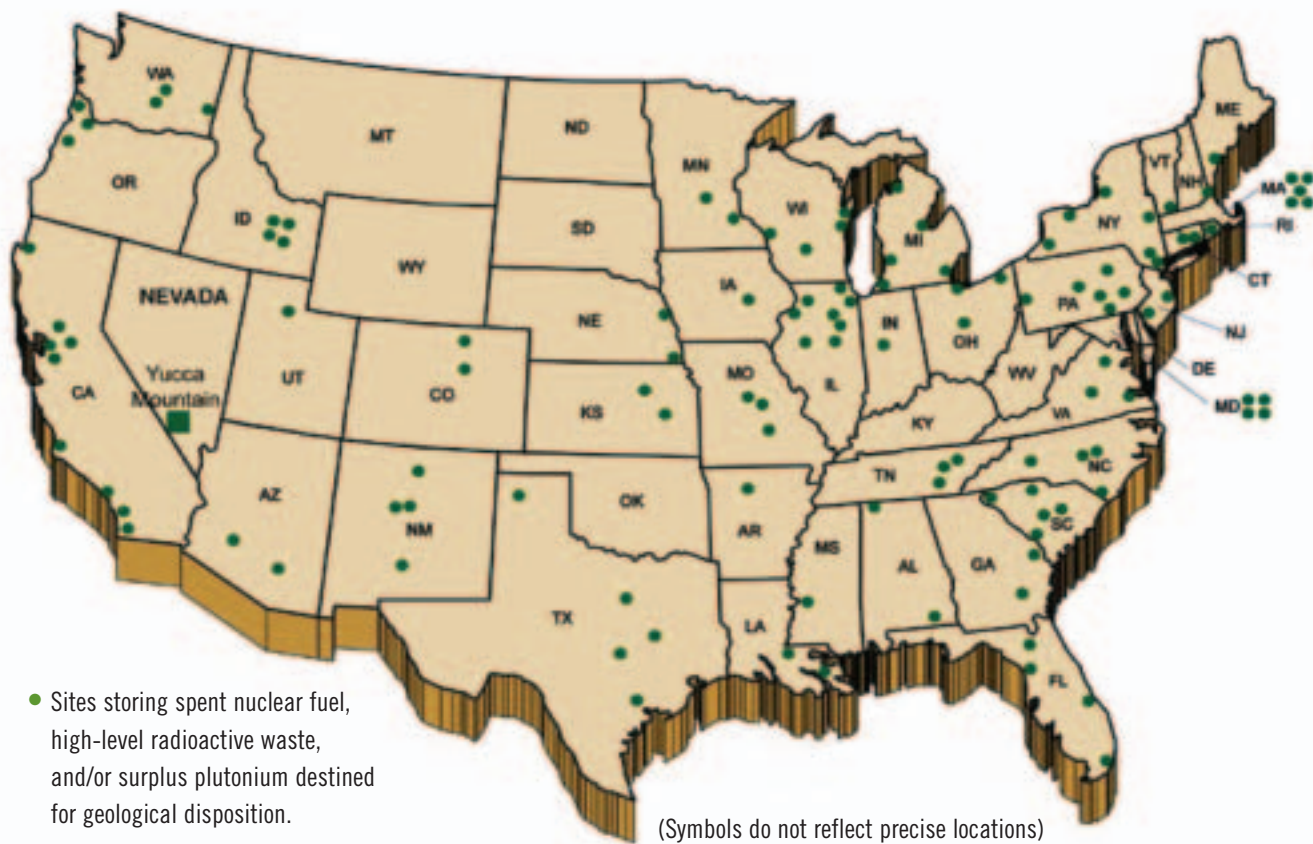
- **Regulatory Requirements:** The Nuclear Policy Act, as amended, requires that a repository at Yucca Mountain, Nevada, must be licensed by the NRC, which will base its review of the Department's license application submittal against its licensing requirements, including radiation protection standards issued by the Environmental

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Protection Agency. The Environmental Protection Agency regulations have not yet been finalized. As a license applicant, the Department must also have its Licensing Support Network certification accepted by the NRC six months prior to the license application submittal.

- **Litigation:** Any actions by the Department or other agencies that advance either the repository or transportation, e.g., environmental impact statements are likely to be challenged in the courts.

- **Legislation:** Proposed legislation has been introduced that contains a number of provisions to facilitate the licensing, construction and operation of a repository at Yucca Mountain. These provisions will permit the Department to accelerate fulfillment of its responsibilities, without diminishing the protection currently afforded workers, members of the public and the environment.



**Waste Locations:** A national map of current waste locations.

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# CORPORATE MANAGEMENT

## — PRESIDENT'S MANAGEMENT AGENDA —

The President, in his 2001 President's Management Agenda (PMA), challenged the Federal Government to become more efficient, effective, results-oriented and accountable. Over the past four years, the PMA has become the primary framework by which the Department has implemented changes to support the President's management goals. The PMA reflects the President's on-going commitment to achieve immediate and measurable results that matter to the American people.



***“What matters most is performance and results. In the long term, there are few items more urgent than ensuring that the Federal Government is well-run and results-oriented.”***

**- President George W. Bush**

Each agency is held accountable for its performance in carrying out the PMA through quarterly scorecards issued by OMB. Agencies are scored green, yellow or red on their status in achieving overall goals or long-term criteria, as well as their progress in implementing improvement plans.

The Department is scored against six PMA initiatives: five government-wide areas and one agency-specific areas. Each year, the Department and OMB consider progress made over the previous year and create a plan for the upcoming year's PMA-related activities. The plan is used by the Department to guide further management reforms, and by OMB as the baseline for assessing the Department's quarterly performance. Further information on OMB's management of the PMA may be found at <http://www.results.gov>.

FY 2006 saw many significant accomplishments in each of the six PMA areas. Key achievements in each of the six PMA areas are discussed below.

Initiative	As of September 30, 2006	
	Status	Progress
Human Capital	TBD	TBD
Competitive Sourcing	Green	Green
Financial Performance	Red	Green
E-Government	Yellow	Green
Budget & Performance Integration	Green	Yellow
Federal Real Property Asset Mgt.	Green	Green
Green: Implementation is proceeding according to plan. Yellow: Some slippage or other issue(s) requiring adjustment. Red: Initiative in serious jeopardy absent significant management intervention.		

**Strategic Management of Human Capital** – The Department continues to make significant progress in its management of human capital. Specifically, the Department reduced the under-representation of minorities in its workforce, especially in the area of Hispanic employment. Additionally, DOE took additional steps to reduce or eliminate skills gaps in critical mission occupations. For example, as of May 2006, all major DOE projects are now being managed by certified project managers. In addition, the Department has developed a revised Human Capital Management Strategic Plan.

**Competitive Sourcing** – The Department has studied 1,228 Federal and over 1,022 contractor positions since FY 2002 as part of eight competitive sourcing studies. As a result of the competitions completed to date, DOE expects to save taxpayers over \$538 million.

**Improved Financial Performance** – The Department implemented an aggressive plan to mitigate and remediate the financial management challenges that were identified since receiving a disclaimer of opinion on its FY 2005 financial statements. On the heels of converting to a new Standard General Ledger compliant financial accounting system during FY 2005, the remediation effort has already resulted in significant improvements in the underlying business practices used complex-wide. In January 2006, a new cost accrual methodology was put into place which automatically accrues cost on the thousands of outstanding obligations each month. Project management at the Department was enhanced using Earned Value Management system certifications and techniques that objectively track physical accomplishment of work and provide early warning of performance

problems, increasing the likelihood that projects will stay within planned cost and schedule. Real property management was improved by establishing a departmental framework of internal controls, including a standard validation process and formal classes to teach the process. The Department continues its aggressive effort to build and improve its integrated business management system, I-MANAGE, and the associated I-MANAGE Data Warehouse. Together, these systems enhance decision-making with increased availability and reliability of financial and other business data, and by providing these just-in-time data at the desktops of managers. Future modules of the I-MANAGE suite under development include a budget formulation system and a standard procurement capability.

**Expanded Electronic Government** – The Department has made considerable progress in achieving PMA objectives for Expanded Electronic Government in FY 2006. Key accomplishments include a renewed emphasis and focus on cyber security as demonstrated by completion of a Cyber Security Revitalization Plan in March 2006, and the subsequent issuance of over twelve new cyber security guidance documents; enhanced and better integrated information technology (IT) management processes to ensure that IT fully aligns with and supports Departmental missions; and the establishment and use of the DOE Enterprise Architecture as a strategic driver for future IT management. These accomplishments are validated by Office of Management and Budget approval of the over \$2 billion in the budget year 2007 IT portfolio.

**Budget and Performance Integration** – The Department continues to improve and expand the integration between budget and performance information. This past year, senior leadership formulated a new Department-wide Strategic Plan that will be the foundation of future budgets and the lens through which the performance of the Department is evaluated. Working with the Office of Management and Budget, the Department completed a five year project to assess all programs using the Program Assessment Rating Tool (PART); the Department's average score on PART is moderately effective. Finally, the Department issued its first ever agency-wide multi-year budget plans to Congress in March 2006, which serve as the five year planning window that bridges the high-level goals of the Strategic Plan and the key funding objectives of the annual budget request to Congress.

**Federal Real Property Asset Management (Agency-Specific)** – Last year, the Department issued its Asset Management Plan (AMP) providing the guidelines and principles for managing the real property portfolio. This year, the Department prepared an implementation document (the “Three Year Rolling Timeline”) outlining specific activities meant to meet the goals of the plan. The Department continued to improve its Facility Information Management System and satisfied the Federal Real Property Council’s goal of 100 percent reporting of all data elements. Further, to enhance the integrity and reliability of the Department’s real property data, a statistical validation program was established to monitor data accuracy and correct deficiencies.



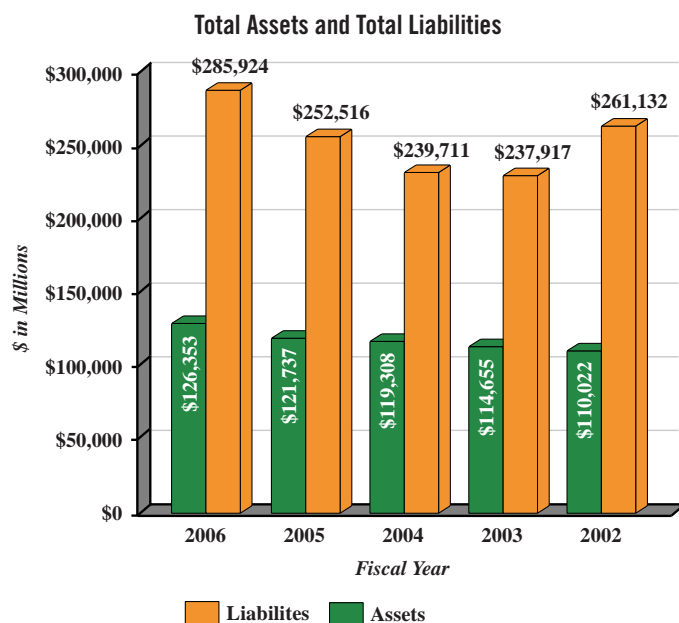
*“Working together, we will achieve our goal of steadily improving every Department of Energy program and continue to transform the Department into an organization that makes good on its promises and delivers results for the Nation.”*

*– Energy Secretary Samuel W. Bodman*

## — ANALYSIS OF FINANCIAL STATEMENTS —

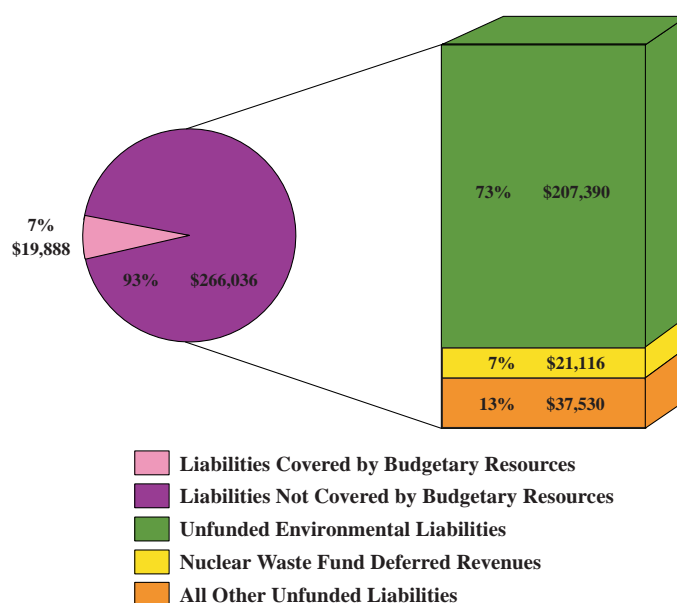
The Department's financial statements, which are included in the Financial Results section of this report, received an [ ] opinion from KPMG LLP. Preparing these statements is part of the Department's goal to improve financial management and provide accurate and reliable information that is useful for assessing performance and allocating resources. The Department's management is responsible for the integrity and objectivity of the financial information presented in these financial statements.

The financial statements have been prepared to report the financial position and results of operations of the entity, pursuant to the requirements of 31 U.S.C. 3515(b). The statements have been prepared from the Department's books and records in accordance with generally accepted accounting principles (GAAP) prescribed by the Federal Accounting Standards Advisory Board and the formats prescribed by the Office of Management and Budget. The financial statements are prepared in addition to the financial reports used to monitor and control budgetary resources which are prepared from the same books and records. The statements should be read with the realization that they are for a component of the U.S. Government, a sovereign entity.



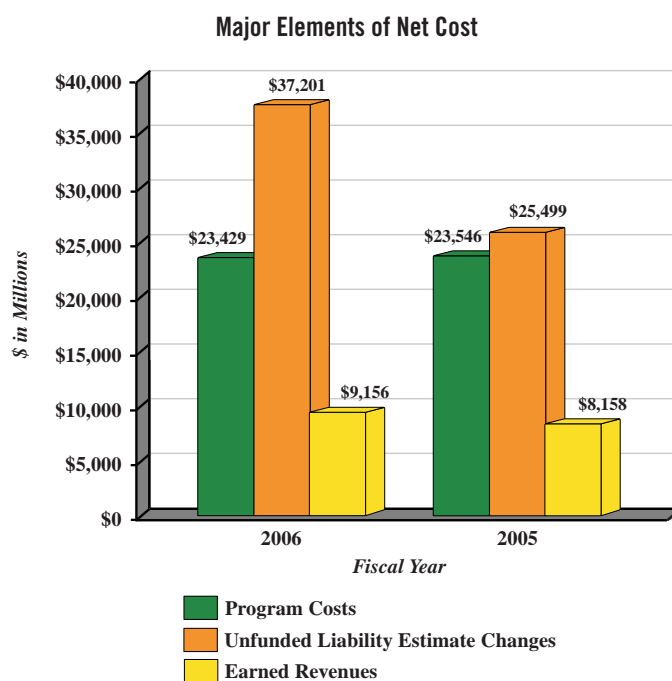
**Balance Sheet.** The Department has significant unfunded liabilities that will require future appropriations to fund. The most significant of these represent ongoing efforts to cleanup environmental contamination resulting from past operations of the nuclear weapons complex. The FY 2006 environmental liability estimate totaled \$219 billion and represents one of the most technically challenging and complex cleanup efforts in the world. Estimating this liability requires making assumptions about future activities and is inherently uncertain. The future course of the Department's environmental management program will depend on a number of fundamental technical and policy choices, many of which have not been made. The cost and environmental implications of alternative choices can be profound.

**FY 2006 Liabilities (\$in Millions)**



Changes to the environmental baseline estimates during FY 2006 and FY 2005 (unaudited) resulted from inflation adjustments to reflect constant dollars for the current year; improved and updated estimates for the same scope of work; revisions in acquisition strategies, technical approach or scope; regulatory changes; cleanup activities performed; additional scope and transfers out of the environmental baseline estimates; and additions for facilities transferred from the active and surplus category.

**Net Cost of Operations.** The major elements of net cost include program costs, unfunded liability estimate changes, and earned revenues. Unfunded liability estimate changes result from inflation adjustments;



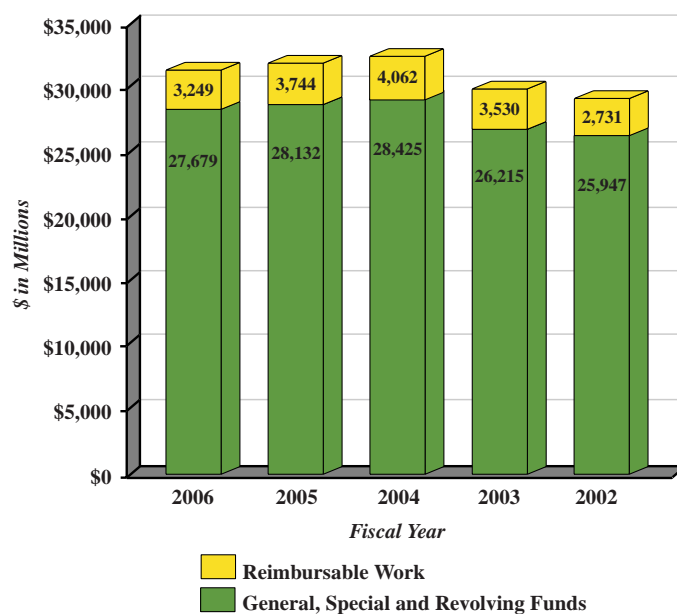
improved and updated estimates; revisions in acquisition strategies, technical approach, or scope; and regulatory changes. The Department's overall net costs are dramatically impacted by these changes in environmental and other unfunded liability estimates. Since these estimates primarily relate to the cost of prior years operations, they are not included as current year program costs, but rather reported as "Costs Not Assigned" on the Consolidated Statements of Net Cost. Program costs also exclude current-year expenditures for environmental cleanup work as those costs were accrued in prior years.

**Budgetary Resources.** The Combined Statements of Budgetary Resources provide information on the budgetary resources that were made available to the Department for the year and the status of those resources at the end of the fiscal year. The Department receives most of its funding from general government funds administered by the Department of the Treasury and appropriated for Energy's use by Congress. Since budgetary accounting rules and financial accounting rules may recognize certain transactions at different points in time, Appropriations Used on the Consolidated Statements of Changes in Net Position will not match costs for that period. The primary difference results from recognition of costs related to changes in unfunded liability estimates. The Consolidated Statements of Financing reconcile the accrual-based and budgetary-based information.

#### Pension/Post Retirement Benefits (PRB) Liabilities Trend Analysis.

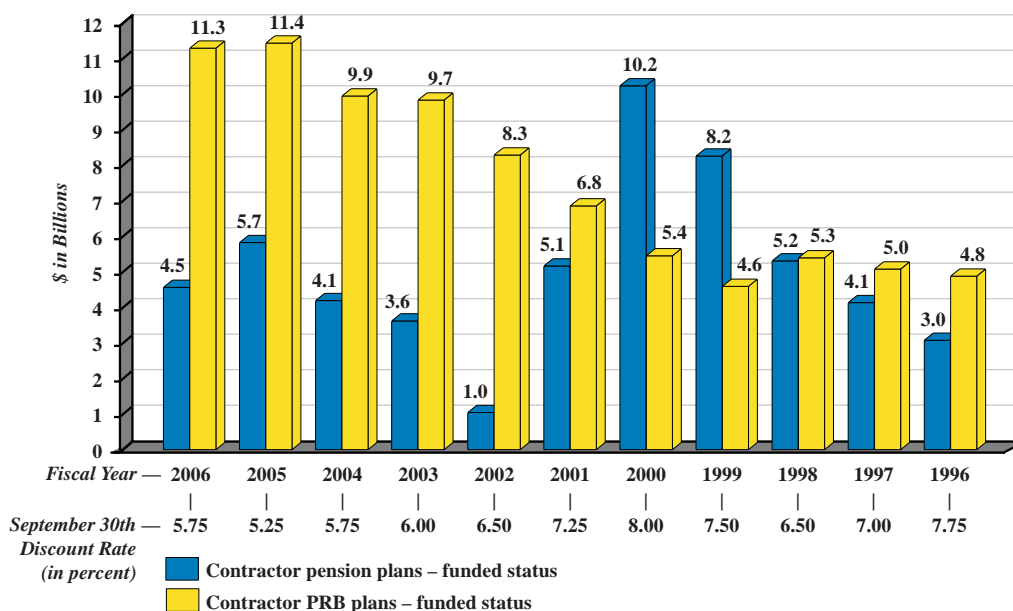
A 50 basis point increase from its historical low in the discount rate used to estimate contractor employee pension plan obligations was the primary reason for an improvement in the funded status from an under funding of more than \$5.7 billion last year to an under funding of almost \$4.5 billion in FY 2006 for these plans. The discount rate increase improved the funding by \$2.5 billion, but was offset partially by the cost of additional benefits accruing and other losses during the year. A return to the pre-2002 levels of discount rates could significantly reduce or eliminate the unfunded pension obligation.

Obligations Incurred



A similar change in the discount rate used to estimate the obligations of contractor postretirement benefits other than pensions improved the funded status by \$1.0 billion, but was nearly offset by the cost of additional benefits accruing, higher than expected increases in the cost of medical care, and other losses during the year. Assets are not generally set aside to fund PRB plans as they are for pension plans, so PRB plans are not expected to ever become fully funded.

Changes in the estimated plan benefit obligations are generally amortized over an extended time period, and therefore do not result in an immediate change in unfunded liabilities recorded by the Department. However, the size and direction of changes in the funded status have significant implications for future funding and budgeting needs. The table below shows the funded status for contractor employee pension, PRB plans and the year-end discount rate from FY 1996 to FY 2006.



## Management Assurances

The Department's management is responsible for establishing and maintaining an effective system of internal controls to meet the objectives of the Federal Managers' Financial Integrity Act.

To support management's responsibilities, the Department is required to perform an evaluation of management and financial system internal controls as required by Sections II and IV, respectively, of OMB Circular A-123, Management's Responsibility for Internal Control, and internal controls over financial reporting as required by Appendix A of the Circular.

The Department has completed its evaluation of management and system controls and, based on that evaluation, can provide reasonable assurance that internal control over the effectiveness and efficiency of operations and compliance with applicable laws and regulation as of September 30, 2006, was operating effectively with no material weaknesses found in the design or operation of the internal controls. Evaluation results also indicated that the Department's financial management systems generally conform to governmental financial system requirements and are not in compliance with the Federal Financial Management Improvement Act.

In addition, the Department has completed its FY 2006 limited scope evaluation of internal control over financial reporting, which includes safeguarding of assets and compliance with applicable laws and regulations, as required by Appendix A of OMB Circular A-123 and Departmental requirements. The evaluation included an assessment of both entity and process controls, as required. Based on the results of the evaluation, the Department is providing reasonable assurance that, except for the material weaknesses noted later in this section, internal controls over financial reporting as of June 30, 2006, were working effectively and no other material weaknesses were identified in the design or operation of the specific controls over financial reporting evaluated. However, the Department cannot provide complete assurance due to the Department's approved scope limitation. A complete assurance (qualified or unqualified) can only be provided upon completing a full scope assessment of all high, medium and low-risk activities.

**Samuel W. Bodman**  
November 15, 2006



## Federal Managers' Financial Integrity Act

The Federal Managers' Financial Integrity Act (FMFIA) of 1982 requires that agencies establish internal control and financial systems to provide reasonable assurance that the integrity of Federal programs and operations is protected. Furthermore, it requires that the head of the agency provide an annual assurance statement on whether the agency has met this requirement and whether any material weaknesses exist.

In response to the FMFIA, the Department developed an internal control program which holds managers accountable for the performance, productivity, operations and integrity of their programs through the use of management controls. Annually, senior managers at the Department are responsible for evaluating the adequacy of the internal controls surrounding their activities and determining whether they conform to the principles and standards established by the OMB and the GAO. The results of these evaluations and other senior management information are used to determine whether there are any internal control problems to be reported as material weaknesses. The Departmental Internal Control and Audit Review Council, the organization responsible for oversight of the Management Control Program, makes the final assessment and decision for the Department.

### Appendix A of OMB Circular A-123

New internal control requirements for publicly-traded companies contained in the Sarbanes-Oxley Act of 2002 paved the way for the Federal government to also strengthen its internal control requirements. The issuance of Appendix A of OMB Circular A-123 provides new specific requirements to agencies for conducting management's assessment of internal control over financial reporting. The Department has adopted, with the approval of OMB, a three year, phased approach for implementing the new requirements in Appendix A of OMB Circular A-123. For 2006, the scope for Federal sites was limited to the high-risk activities that are most critical to supporting our financial statement audit goals. For contractor sites, the scope included all high-risk activities. All activities, including medium and low-risk, are expected to be completed by the end of FY 2008. Material weaknesses identified as of June 30, 2006:

- Controls over entries to record reductions to environmental liabilities and Construction Work in Progress related to legacy waste expenditures were not working effectively. Controls failed to prevent or detect, in a timely manner, material differences between reductions to legacy waste facilities and environmental liabilities for current year legacy waste capital expenditures.
- Controls over reconciliation and confirmation of interoffice accounts receivable and accounts payable were not working effectively. Standard Accounting and Reporting System (STARS) reports necessary to facilitate interoffice reconciliations were not available in time for field offices to

confirm interoffice receivables and payables prior to the preparation of the Department's third quarter financial statements.

- Controls to ensure integrated contractors properly recorded current year changes to pension and post retirement benefits other than pensions (PRB) unfunded liabilities were insufficient to identify the use of the incorrect Standard General Ledger accounts and program values. STARS edits and/or Headquarters reconciliation procedures failed to identify entries made by integrated contractors that did not comply with the Department's guidance for unfunded pension and PRB liabilities.

Although the material weaknesses described above were identified as of June 30, 2006, appropriate corrective actions have been taken. Therefore, these issues are not considered material for the year-end financial statements presented in this report.

The following material weakness was identified subsequent to June 30, 2006:

- Controls over the recording of obligations and the timely de-obligations of funds in excess of those needed to cover undelivered orders need to be improved. These controls include performing periodic reviews of undelivered orders to ensure they are valid and supported by source documents.

The Department has initiated corrective actions to remediate this material weakness. Specifically, supplemental 2108 review guidance was issued to all field offices to perform a year-end analysis of balances of undelivered orders and accounts payable in excess of \$100,000 that have had no activity for the past twelve months and to deobligate funds where warranted. This effort will mitigate the risk of any material misstatements of undelivered orders at year-end until a more comprehensive review of these balances can be performed in FY 2007.

### Federal Financial Management Improvement Act

The Federal Financial Management Improvement Act (FFMIA) of 1996 was designed to improve Federal financial management and reporting by requiring that financial management systems comply substantially with three requirements: (1) Federal financial management system requirements; (2) applicable Federal accounting standards; and (3) the United States Government Standard General Ledger at the transaction level. Furthermore, the Act requires independent auditors to report on agency compliance with the three stated requirements as part of financial statement audit reports.

The Department has evaluated its financial management systems and, based on issues identified in the area of undelivered orders, the Department is reporting a FFMIA non-compliance. Additionally, our independent auditors have reported a material weakness related to undelivered orders. A description of the material weakness and the Department's planned corrective actions are summarized above.

### Federal Information Security Management Act

The Federal Information Security Management Act (FISMA) of 2002 provides a comprehensive framework for establishing and ensuring the effectiveness of security controls for information and information systems that support Federal assets and operations. In accordance with FISMA, the CIO is responsible for developing, maintaining, ensuring compliance with and reporting annually on the agency's progress in implementing the agency's information security program.

The Department is committed to improving the protection of its information and information systems through a strong cyber security management program. During FY 2006, the Department's senior management created the Cyber Security Executive Steering Committee. The committee is chaired by the CIO and includes the Department's three Under Secretaries, the Chief Health, Safety, and Security Officer, the Administrator of the EIA and a senior representative of the Power Marketing Administrations as active members. The Secretary and the Deputy Secretary are personally involved in cyber security management and have guided the development of a Cyber Security Revitalization Plan to focus higher level attention to the management of cyber security across the DOE complex.

The Cyber Security Revitalization Plan, developed by the Executive Steering Committee and approved by the Deputy Secretary, establishes a governance framework for cyber security management in the Department through a partnership between Office of the CIO, the Under Secretaries and other senior management to provide mission-focused protection of all DOE information and information systems. The Steering Committee has also established a Cyber Security Working Group, which participates actively in the development of cyber security guidance and in other cyber security activities.

During FY 2006, the Department has made significant improvements to its cyber incident handling capability, including initiating continuing action in real time by a Department-wide cyber forensics team that addresses the most serious cyber attacks that it faces. Improvements have been made in cyber security incident management coordination with other Federal agencies and cyber incident reporting to the IG and other key Departmental organizations. The Department has also engaged in a continuing cyber security awareness campaign involving DOE senior management and the entire complex, especially with regard to actions our employees and contractors can take to improve our cyber security posture. The Department has taken steps to improve its secure configuration management and to improve its Department-wide automated asset management/inventory management processes. Use of continuous vulnerability scanning has been expanded to include the entire Department.

## — MANAGEMENT CHALLENGES AND SIGNIFICANT ISSUES —

The Department carries out multiple, complex and highly diverse missions. Although the Department is continually striving to improve the efficiency and effectiveness of its programs and operations, there are some specific areas within DOE's operations that merit a higher level of focus and attention. These areas represent the most daunting management challenges and significant issues the Department faces in accomplishing its mission. The Reports Consolidation Act of 2000 requires that, annually, the Inspector General (IG) prepare a statement summarizing what he considers to be the most serious management and performance challenges facing the Department to be included in the Performance and Accountability Report (PAR). The IG's statement, included in the Financial Results section of the PAR, identifies these challenges. Similarly, in FY 2003 the Government Accountability Office (GAO) identified six major management challenges and program risks to be addressed by the Department.

The Department, after considering the areas identified by the IG, GAO and all other critical activities within the agency, has identified 10 "Significant Issues" that represent the most important matters facing DOE now and in the coming years. It is the Department's goal that resolution of these Significant Issues will help mitigate the IG and GAO management challenges as well as internally identified issues.

The Department aggressively pursues corrective actions for all challenges, whether identified externally by the IG, GAO or internally. As a result of corrective actions taken on the following two FY 2005 Significant Issues, the Department no longer identifies these areas on the FY 2006 list of Significant Issues. To ensure that appropriate focus and attention remains with these areas, the Department will continue to internally track further enhancements and actions.

### Financial Control and Reporting

In FY 2005, the Department reported that operational issues surrounding the overlapping implementations of the financial services "Most Efficient Organization" (MEO) and new accounting and reporting systems created significant challenges in the area of financial control and reporting. The lack of fully documented processes and operational procedures exacerbated reconciliation and data conversion issues, and staffing and skill mix problems negatively impacted MEO start-up operations and the ability to effectively deal with those issues. Since that time, critical policies and procedures have been put in place, key processes have been documented and a resource plan has been initiated to ensure the strategic training and deployment of staff to effectively mitigate the challenges faced in FY 2005.

The progress made in addressing the critical milestones to resolve this issue have minimized the potential impacts of the remaining issues; therefore, financial control and reporting will no longer be reported as a Significant Issue. However, while these issues have been stabilized, the Department recognizes that additional work needs to be done and will continue to internally track all of the previously identified milestones to completion. In addition, material issues related to financial control and reporting are being captured in the OMB Circular A-123 reporting section of this report.

### Information Technology Management

Since FY 2000, the Department has reported a significant issue regarding the ability to fully implement Federal information technology requirements of the Clinger-Cohen Act of 1996 and OMB Circular A-130. In FY 2006, the last of the critical milestones required to resolve this issue were completed. In doing so, key strategy objectives were accomplished including centralizing the Department's information technology management approach, expanding control and influence of the Chief Information Officer (CIO) in the program budgeting process and establishment of an information technology baseline. These actions have provided managers with sufficient information to make sound information technology investment decisions and have laid the foundation for the CIO to better guide and influence the acquisition of technology resources within the Department.

Based on the progress made in this area, information technology management will no longer be reported as a significant issue; however, the Department recognizes that the ever-changing technology landscape will continue to pose new challenges. Therefore, we will continue to pursue and internally track additional actions and strategies to further enhance our information technology management activities.

## FY 2006 Management Challenges and Significant Issues Crosswalk

To highlight how the Department's strategy for mitigating its Significant Issues addresses the IG and GAO challenge areas, the following table provides a crosswalk of the relationship between the three. Please note that the IG and GAO did identify areas that are not

currently reported as Significant Issues by the Department. While the ongoing importance of those areas is recognized and they continue to receive appropriate management attention, due to the progress the Department has made in those areas in the past, they are no longer considered to be significant management problems.

IG Challenge Area	GAO Challenge Area	Significant Issue Identified By the Department
Contract Management (S)	Resolve problems in contract management that place agency at high risk for fraud, waste and abuse (S)	Oversight of Contractors (S)
		Acquisition Process Management (S)
Safeguards and Security (D)	Address security threats and problems (D)	Security (D)
Environmental Cleanup (D)	Improve management for cleanup of radioactive and hazardous wastes (D)	Environmental Cleanup (D)
		Nuclear Waste Disposal (D)
Stockpile Stewardship (D)	Improve management of the Nation's nuclear weapons stockpile (D)	Stockpile Stewardship (D)
Project Management (D)		Project Management (D)
Cyber Security (S)		Unclassified Cyber Security (S)
Energy Supply (D)	Enhance leadership in meeting the Nation's energy needs (D)	
	Revitalize infrastructure (S)	
<b>IG Watch List</b>		
Human Capital Management (S)		Human Capital Management (S)
Worker and Community Safety (S)		Safety & Health (S)
Financial Management and Reporting (S)		

(D) Mission Direct (S) Mission Support

## Oversight of Contractors

### Description of Issue

Improvements are needed in the oversight of contractors managing and operating the Department's facilities. Specific oversight problems have been identified at environmental cleanup sites and laboratories conducting national security and scientific activities. Adequate oversight is needed to ensure that contractor operations are effective and efficient.

### Actions Taken & Remaining

In FY 2006, the Department's Office of Science (SC) continued implementation of its new restructured organization that places clear line management accountability for the laboratory contracts at the Site Office. This sharpened focus within SC ensures efficient and effective SC laboratory mission and operational performance. SC also utilized its new contract approach to complete the Thomas Jefferson National Accelerator Facility contract. Over the next 24 months this new approach will be utilized to compete the contracts at the Argonne, Ames, Fermi and Princeton laboratories. In addition, SC has completed its revision of new performance measures and has been conducting both technical and business reviews with each of their laboratory contractors.

Recognizing the need for increased focus on planning and management of contracts and the competitive procurement process, the Department has restructured its Office of Environmental Management (EM) to include a Deputy Assistant Secretary for Acquisition and Project Management. This reorganization will establish more systematic ways to identify lessons learned from past contract awards; emphasize training for its contracting staff; streamline acquisition activities; develop consistent contracting strategies that are expected to lead to shorter procurement lead-times; and institute more timely resolution of contracting issues leading to contract modifications.

Additionally, National Nuclear Security Administration (NNSA) Site Manager reporting has been realigned to the Deputy Administrator for Defense Programs to enhance management accountability and provide consistent programmatic, management and administrative guidance to all areas, including contract administration.

### Expected Completion

Correction is expected to extend into the out-years with the completion date to be reassessed in FY 2007.

## Acquisition Process Management

### Description of Issue

The Department is the largest civilian contracting agency in the Federal government and spends approximately 90 percent of its annual budget on contracts to operate its scientific laboratories, engineering and production facilities and environmental restoration sites. A June 2006 GAO report cited concerns involving delays in awarding contracts and the need for a systematic method to share lessons learned from contract awards.

### Actions Taken & Remaining

To improve the timeliness in awarding contracts, several actions are underway. For example, EM, which has the majority of complex procurement actions, is staffing a new organization to plan and implement its procurements. The Office of Management has developed a monthly report for senior leaders on the status of major procurements. Also, regular meetings between senior program, management and procurement leaders have been implemented to discuss at-risk procurements.

The Department also continuously identifies and shares lessons-learned with DOE staff. Recent ongoing source evaluation board training conducted in the field provided procurement and technical staff with current policy, the latest guidance and lessons-learned from analysis of past DOE competitive procurements.

The Department's Chief Acquisition Officer will lead a review of the process used Departmentwide to award major procurements with the goals of identifying and eliminating unnecessary, inefficient and redundant steps, improving timeliness of contract awards and better sharing of lessons learned. Recommendations for improvement will be identified and included in an action plan with milestones and performance metrics.

### Expected Completion

FY 2007

## Security

### Description of Issue

Unprecedented security challenges have evolved since the events of September 11, 2001. The need for improved homeland defense, highlighted by the threats of terrorism and weapons of mass destruction, created new and complex security issues that must be surmounted to ensure the protection of our critical energy resources and infrastructure. These have made it necessary for the Department to reassess and strengthen its security postures.

### Actions Taken & Remaining

In May 2004, the former Secretary of Energy announced a set of sweeping new initiatives to improve security across the Department's nationwide network of laboratories and defense facilities, particularly those housing weapons-grade nuclear material. The Department's continued completion of these initiatives will ensure the Department has a clear strategic security plan outlining the Department's future security course, conducts ongoing threat analyses to establish the framework for continually improving security protective measures and enhances the physical security of our facilities. In FY 2006, a number of actions were taken to improve security across the Department. These actions focused on implementing the necessary improvements to meet the current Design Basis Threat Policy to include revising vulnerability assessments; evaluating, testing and deploying security technologies; and implementing the elite protective force model. Through an integrated approach, the Department is working to coordinate site mission, operations, security technologies and the elite protective force to provide more robust security protection measures at a lower overall cost. The Security Technologies Demonstration at the Idaho National Laboratory included this approach and the results of this successful demonstration are being combined with a review of security protection measures. This approach will be initiated throughout the Department to build an efficient security program that is also flexible to meet both today's threat and tomorrow's challenges.

NNSA continued the implementation of processes, procedures and technologies to fully implement the Enhanced Design Basis Threat. Resource and planning documents were developed for the Diskless Workstation Conversion Secretarial initiative. During FY 2006, NNSA also continued work with various programmatic and administrative elements to meet portions of Homeland Security Presidential Directive-12 access controls requirements. NNSA also continued to address specific security operations and personnel issues identified by the IG and GAO.

### Expected Completion

Long-term correction is expected due to the continuing nature of security threats.

## Environmental Cleanup

### Description of Issue

There are significant long-term compliance and waste management problems at the Department's facilities due to past operations that left risks to the environment. Even though these issues resulted from earlier activities conducted in a different atmosphere and under less stringent standards than today, the Department is committed to maintaining compliance with current environmental laws and agreements.

### Actions Taken & Remaining

The Department continues to make progress in cleaning up contaminated sites. In FY 2006, six sites achieved cleanup completion - the Rocky Flats Site in Colorado, Ashtabula and Columbus Sites in Ohio, Lawrence Livermore National Laboratory - Main Site and Sandia National Laboratory in California and the Kansas City Plant in Missouri. In addition, the Fernald Site in Ohio is expected to be completed by the end of the calendar year. Also, the Lawrence Berkeley National Laboratory in California and Miamisburg Site in Ohio are also expected to complete cleanup activities in FY 2007. Longer term activities within the EM program include treating radioactive liquid waste into a stable form; safely storing nuclear materials; disposing transuranic and low-level waste; and decontaminating and decommissioning excess facilities and remediating the surrounding environment.

While cleanup progress continues to be made, there have been some setbacks. Several assumptions made as part of the Accelerated Cleanup initiative have not materialized; new work scope from emerging cleanup requirements has now been identified; and execution of some key projects has not been adequate. In addition, at EM target funding levels, the Department believes that there are major uncertainties regarding its ability to comply with current requirements in its environmental cleanup agreements and with other requirements. These target levels were developed based on the now outdated accelerated site closure strategy and assumptions. The Department is currently updating these assumptions to reflect known changes in the regulatory and statutory requirements, incorporate changes based on actual program performance and to incorporate technological and acquisition strategies to meet the Department's long-term environmental commitments. In addition, EM continues to implement robust project management principles including the refinement and validation of resource-loaded project baselines and senior leadership monitoring of cost and schedule performance.

### Expected Completion

Correction is expected to extend to the out-years with the completion date to be reassessed in FY 2008.

## Nuclear Waste Disposal

### Description of Issue

Construction of a repository for the disposal of spent nuclear fuel and high-level radioactive waste, authorized under the Nuclear Waste Policy Act, at Yucca Mountain, Nevada, has been delayed due to external factors and program adjustments. Funding shortfalls and the scientific and technical challenges encountered in this first-of-a-kind endeavor to develop a disposal system that must potentially endure a compliance period of a million years, have complicated the steady progress necessary to achieve previously published milestones. Mitigating the external factors for steady funding, finalizing the Environmental Protection Agency (EPA) radiation protection standards and addressing the licensing requirements of the Nuclear Regulatory Commission (NRC) to submit a license application are the key to achieving the new milestones published in July 2006.

### Actions Taken & Remaining

The introduction of the Nuclear Fuel Management and Disposal Act, in April 2006, seeks to provide stability, clarity and predictability to the Yucca Mountain Project. The proposed legislation addresses many of the uncertainties that are currently beyond the control of the Department and have the potential to significantly delay the opening date for the repository. The most important factor is the ability of the Department to have access to the Nuclear Waste Fund to support the cash flows needed to implement the Project.

The Program adopted a primarily canister-based approach for handling commercial spent nuclear fuel. The revised approach enabled deployment of necessary surface and sub-surface facilities in a manner that could accommodate future funding and income streams and enhances repository operations and performance.

In January 2006, the Department designated Sandia National Laboratories the lead laboratory to coordinate and organize all scientific work on the Project. Sandia National Laboratories has been tasked to review the existing infiltration model and to prepare a new model. The new model and the results will be used as part of the technical basis for the license application.

The Program is implementing management controls in accordance with DOE O 413.3, *Program and Project Management for the Acquisition of Capital Assets*, and performance metrics required under the Department's performance and accountability report system and Office of Management and Budget reporting requirements to ensure it achieves its revised milestones. Additionally, the Program is proceeding to certify its earned value management system which will be in place prior to critical decision-2, Approve Performance Baseline.

### Expected Completion

Submittal of a license application to the NRC by June 30, 2008; construction authorization from the NRC by 2011; and receipt of a license amendment from the NRC to receive and possess nuclear material by 2017.

## Stockpile Stewardship

### Description of Issue

Stewardship of the Nation's nuclear weapons stockpile is one of the most complex, scientifically technical programs undertaken and the Department needs to ensure that all aspects of this mission-critical responsibility are fulfilled. Based on stockpile stewardship activities, the Secretary, jointly with the Secretary of Defense, annually certifies to the President that the nuclear weapons stockpile is safe and reliable and that underground nuclear testing does not need to resume. Success is dependent upon unprecedented scientific tools to better understand the changes that occur as nuclear weapons age, enhance the surveillance capabilities for determining weapon reliability and extend weapon lives. The Department must ensure that problems in these areas are aggressively addressed.

### Actions Taken & Remaining

Processes have been put in place to eliminate a backlog of surveillance tests and resolve deficiencies in the investigations conducted when weapons problems are identified. Plans and financial controls over weapons refurbishment have been strengthened. Self-assessments of project management processes of the Enhanced Surveillance Campaign have been completed and all sites have developed an Enhanced Surveillance Campaign Project Management Improvement Plan. During FY 2005, the Enhanced Surveillance Campaign Risk Management Plan was issued. The Life Extension Program and sub-elements are now subject to the NNSA's Planning, Programming, Budgeting and Evaluation processes and the Department's project management processes. Resource loaded plans that contain cost, scope and milestones were implemented for the Enhanced Test Readiness Program during FY 2005.

In FY 2006, NNSA announced the details of the Nuclear Weapons Complex 2030, a comprehensive plan to enhance the Department's capability to respond to national and global security challenges while facilitating the President's vision of a smaller stockpile consistent with our national security needs. To guide and oversee Complex 2030, NNSA established the Office of Transformation under its Deputy Administrator for Defense Programs. Other major activities initiated to implement Complex 2030 include a Reliable Replacement Warhead, the acceleration of warhead dismantlement to enhance test readiness and the move toward consolidating special nuclear material to fewer sites.

### Expected Completion

Long-term correction is expected.

## Project Management

### Description of Issue

The Department needs to improve the discipline and structure for approving and controlling program and baseline changes to projects as well as the Departmentwide approach for certifying Federal Project Directors at predetermined skill levels to ensure competent management oversight of resources. In addition, it was determined that the Department needs stronger policies and controls to ensure that ongoing projects are re-evaluated frequently in light of changing missions.

### Actions Taken & Remaining

EM has applied project management principles to all cleanup projects having a total estimated cost greater than \$20 million and is continuing its review of resource-loaded cost and schedule baselines for 88 projects. The baselines describe in detail the activities, schedule and resources required to complete the EM cleanup mission at each site or to construct a major facility at a site. Of the 88 projects, 67 are considered active. External independent reviews have been completed for 47 of the 67 active projects. The remaining 20 projects will have reviews scheduled and conducted as expeditiously as possible.

SC has an established process, recognized as effective by the National Research Council. Results, as measured by the Department's Project Assessment and Reporting System, have demonstrated success.

During FY 2006, NNSA continued their efforts in strengthening and expanding project management capabilities through the certification process of its construction Project Managers.

### Expected Completion

FY 2007

## Unclassified Cyber Security

### Description of Issue

In July 2005, the Deputy Secretary established a Cyber Security Improvement Initiative. The goal of the initiative was to identify improvements that could be made in management, operational and technical cyber security controls within the Department. The first phase of the initiative resulted in the identification of a number of improvements that could be made to cyber security across the agency. The second phase involved conducting Site Assistance Visits (SAVs) to evaluate implementation of cyber security policies and standards, and test the effectiveness of security controls. SAVs have been conducted at several sites, with planned expansion to other DOE operations.

### Actions Taken & Remaining

The Cyber Security Project Team (CSPT), under the direction of SP, and including representatives from the CIO, NNSA and Office of Energy, Science and Environment (ESE), was charged with reviewing systemic problems in the area of cyber security and developing an initial plan of action to improve cyber security across the DOE complex. Following the release of the *DOE Cyber Security Project Team Summary Report and Plan of Action* in November 2005, and management initiatives taken by the incoming CIO, the Secretary and Deputy Secretary of Energy, the Department embarked on an intensive effort to aggressively address systemic weaknesses in the implementation of cyber security. As part of this effort, the CIO coordinated with the Department's Senior Management to develop a plan to revitalize cyber security across the agency. This plan was formally approved by the Deputy Secretary on March 6, 2006. The plan incorporates the recommendations outlined in the CSPT report, establishes a new governance structure that emphasizes implementation and accountability at the Under Secretary level and contains tactical and strategic elements for mitigating systemic weaknesses identified by internal and external oversight organizations.

NNSA initiated a reprogramming of FY 2006 funds to address some of the more immediate cyber security issues. Implementation plans for NNSA's enhanced cyber security directives have been developed by NNSA field organizations and are being put into place.

### Expected Completion

Long-term corrective action is expected due to the evolving nature of security threats.

## Human Capital Management

### Description of Issue

Since 1995, the Department has experienced a 27 percent reduction in the workforce. As of the beginning of Fiscal Year 2005, up to 53 percent of the Department's workforce is eligible for retirement within the next five years. Combined with other factors such as lengthy moratoria on hiring, the relative age of the workforce and a variety of incentives to leave Federal service, the decline in staffing has left the Department with a significant challenge: reinvesting in its human capital to ensure that the right skills, necessary to successfully meet its missions, are available.

### Actions Taken & Remaining

A Departmental framework for addressing this issue was put in place with the implementation of a comprehensive human capital management strategy. The Department has continued its focus on this issue as evidenced by the revision of DOE's Human Capital Management Strategic Plan.

During FY 2006, efforts continued to re-shape the Department's workforce through increased emphasis on performance and accountability. The Department completed total reorganizations in the offices of SC and EM, while the NNSA completed the implementation of all its reengineering plans. NNSA also developed and used Managed Staffing Plans in assigning staffing targets, and in identifying critical hiring needs, skills mix imbalances and buyout eligible occupations. EM implemented its comprehensive Capital Management Plan to address issues of performance excellence and leadership continuity. As part of the Department's efforts under Proud-to-Be III, we developed and implemented a Departmentwide Human Capital Management Assessment Program. In addition, the Department developed performance measures to address the effectiveness of its human capital management activities.

The Department will continue to conduct human capital analyses, identify skill mix issues and realign the Department complex-wide to ensure a workforce that is fully capable of meeting its responsibilities.

### Expected Completion

FY 2007

## Safety & Health

### Description of Issue

Ensuring the Safety and Health of the public and the Department's workers is one of the top priorities in accomplishing our challenging scientific and national security missions. Due to the inherently critical nature of these issues, there is the need for continuous vigilance and improvement. Currently, the Department continues to address emerging safety issues identified within the past year.

### Actions Taken & Remaining

Significant actions have been taken to mitigate Safety and Health concerns. SC continued efforts to identify benchmarks for safety performance and establish a best-in-class performance measure based on performance by the top ten percent of similar research and development industries. These goals are institutionalized and are being incorporated into the lab appraisal plans. SC's plan is to have all labs performing in the top ten percent of research and development (R&D) industries by the end of FY 2007.

The Office of Nuclear Energy (NE) completed planned reviews of Advanced Test Reactor (ATR) safety bases documentation in FY 2006 and will continue these reviews as part of the ATR Documented Safety Analysis reconstitution project. Additionally, NE will complete its implementation of DOE Order 226.1, *Oversight Policy Implementation*. This effort will incorporate an Oversight Proficiency Assurance Program to assure the proper competencies for safety oversight and delegation of safety authorities; and an Oversight Standard Operating Procedure that will require a fully integrated, risk-based oversight schedule starting in FY 2007.

In FY 2006, the Office of Independent Oversight, within the Office of Security and Safety Performance Assurance (SP), continued its mission to evaluate the effectiveness and institutional safety and health processes and the implementation of the core functions of Integrated Safety Management.

In addition to the basic statistical methodology to monitor safety performance, EM adopted a project based approach in FY 2006. By using the EM Earned Value Management System (EVMS), EM is now able to directly tie project performance with contractors' safety performance. The EVMS model to normalization clearly aligns EM's commitment to manage safety through project performance and offers the ability to normalize safety performance data by site, prime contractor and corporate contractor.

For FY 2006, the NNSA's Environmental Safety & Health (ES&H) Advisor and the Chief of Defense Nuclear Security continued their respective efforts with the weapons complex in addressing Defense Nuclear Facilities Safety Board and other Department of Defense safety concerns. The Deputy Administrator for Defense Programs assumed reporting authority for NNSA's site managers in order to strengthen and provide consistent guidance in safety and other management areas.

### Expected Completion

Long-term correction expected with completion to be reassessed in FY 2007.

## — IMPROPER PAYMENTS INFORMATION ACT —

The Improper Payments Information Act (IPIA) of 2002, Public Law (P.L.) No. 107-300, requires agencies to annually review their programs and activities to identify those susceptible to significant improper payments. In addition, the Defense Authorization Act (P.L. No. 107-107) established the requirement for government agencies to carry out cost effective programs for identifying and recovering overpayments made to contractors, also known as “Recovery Auditing.” The OMB has established specific reporting requirements for agencies with programs that possess a significant risk of erroneous payments and for reporting on the results of recovery auditing activities.

While the Department does not have any programs that meet the OMB criteria for significant risk, improper payments are monitored on a quarterly basis to ensure our error rates remain at minimal levels. The Departmental erroneous payment rate has remained below one percent since the inception of our tracking program in FY 2002. To support

continued success, the Department has committed to pursue reduction of improper payments at any one of the Department’s payment sites that exceed a target rate of 1/10 of 1 percent for any quarter. Currently, the majority of all sites are below the target and the sites above target have identified corrective actions.

The Department has established a policy for implementing recovery auditing requirements. This policy prescribes requirements for identifying overpayments to contractors and establishes reporting standards to track the status of recoveries. Analysis of payment activities confirmed a low percentage of overpayments and a high recovery rate. The Department will continue to focus on both the identification and recovery of improper payments to maintain our record of low payment errors and ensure effective stewardship of public funds. Detailed information on IPIA reporting required by OMB is available in the Appendices.

Improper Payments (\$ in millions)				
	FY 2003		FY 2004	
	FY 2005		FY 2006	
	Dollars and/or Rate		Dollars and/or Rate	
Total Payments	\$22,695		\$23,639	
Total Improper Payments	\$13.7	0.06%	\$20.3	0.09%

Note: In FY 2004, Federal payroll payments were excluded due to the outsourcing of the Department’s Federal payroll function.

FY 2005 Overpayments to Contractors (\$ in millions)	
	Dollars
Total Overpayments	\$
Total Recovered	\$
Total Pending Recovery	\$
Total Unrecoverable	\$

Note: Overpayment information required for prior year only.